

UNIVERSITY OF ALBERTA

CALENDAR

of the

Faculty of Graduate Studies

1960-61



Edmonton and Calgary, Alberta

CALENDAR

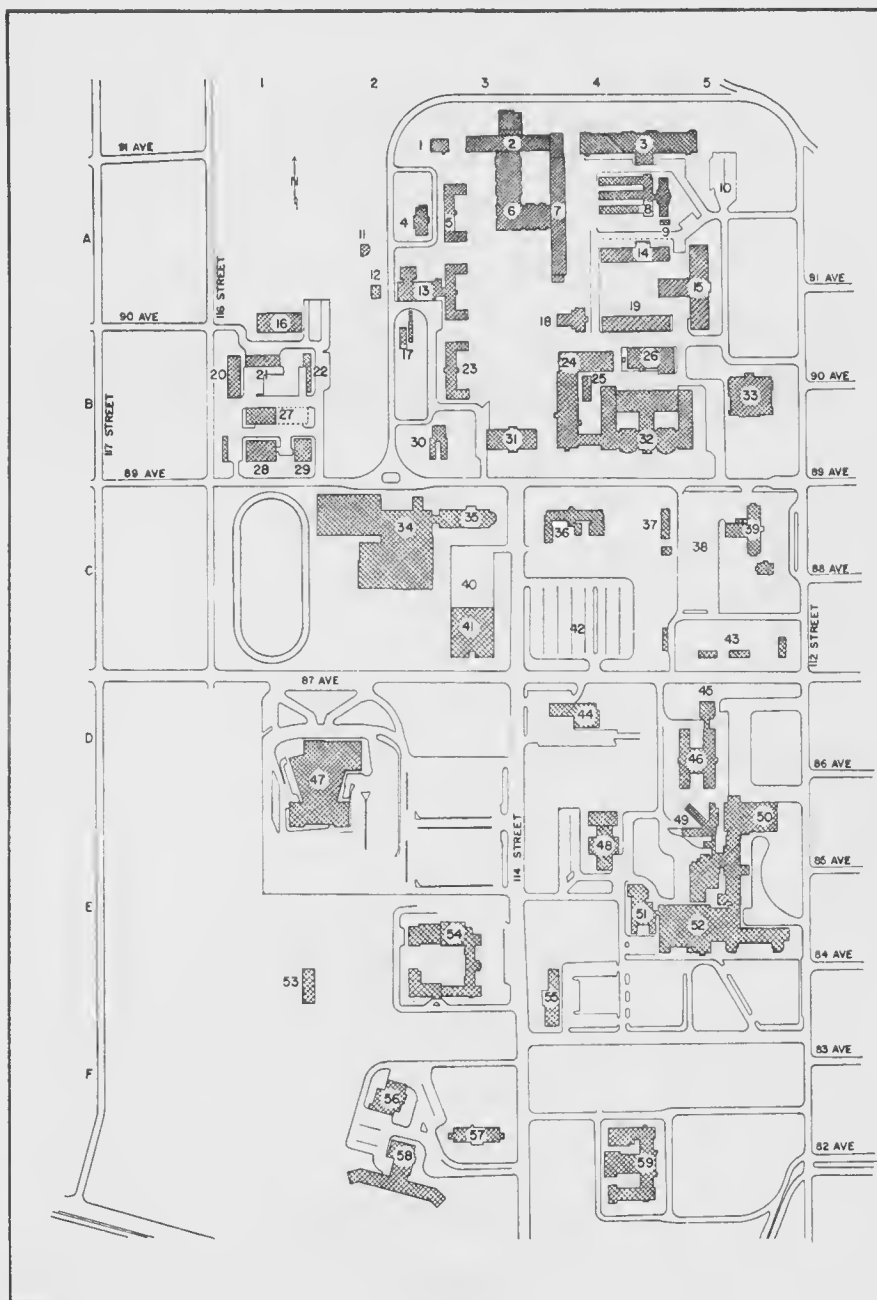
of the

Faculty of Graduate Studies

Fifty-third Session

1960-61

MAP OF EDMONTON CAMPUS



UNIVERSITY OF ALBERTA

DIRECTORY OF BUILDINGS AND DEPARTMENTS, APRIL, 1960

NOTE: The following numbers correspond to reference numbers on the adjacent map.

Aberhart Sanatorium	58	Machine Shop	29
Accounting	15	Mathematics	2
Administration Building	31	Mechanical Engineering	24
Agricultural Engineering, north entrance of	14	Medical Science Building	32
Agriculture and Biological Sciences Building	3	Medicine and Clinical Medicine	52
Alberta Research Council	36	Mining and Metallurgy, east entrance of	14
Alumni Secretary	35	Modern Languages	15
Anatomy, 3rd floor of	32	National Employment Service	31
Animal Science	3	North Laboratory Building	14
Arts Building	15	Nurses' Homes	54, 57
Arts Building Annex	9	Nursing, east end of	36
Assiniboia Hall, Men's Residence	5	Obstetrics and Gynaecology	52
Athabasca Hall, Men's Residence	13	Ophthalmology and Oto-Laryngology	45
Bacteriology, east entrance of	32	Parking Areas	10, 38, 40, 42
Biochemistry, 3rd floor of	32	Pathology, east entrance of	32
Bookstore	31	Pembina Hall, Women's Residence	23
Botany	3	Petroleum Engineering, south entrance of	24
Business Administration, 2nd floor of	15	Pharmacy, 3rd floor of	32
Cafeteria	18	Philosophy, north entrance of	14
Cancer Clinic	51	Physical Education	34
Chemistry	7	Physics	2
Chemical Engineering, west entrance of	32	Physiology and Pharmacology, 2nd floor of	32
Civil Engineering, west entrance of	24	Physiotherapy	4
Classics, 2nd floor of	15	Plant Science	3
Convocation Hall, main floor of	15	Political Economy, 2nd floor of	25
C.O.T.C. Orderly Room	41	Post Office	31
Counselling Services	31	Power Plant	26
Dairying, north entrance of	19	Printing Department	25
Deliveries	27	Provincial Analyst, east entrance of	19
Dentistry, main floor of	32	Provincial Auditorium	47
Dominion Laboratory of Plant Pathology	30	Provincial Gasoline Testing Lab.	44
Drafting	24	Provincial Lab. of Public Health	48
Education Building	59	Provost	31
Electrical Engineering	26	Psychology, north entrance of	14
Engineering Building	24	Radio Studio	15
English, 2nd floor of	15	Research Council of Alberta	44
Entomology	3	Rink	34
Evening Credit Program Director, room 219	59	Rutherford Library	33
Extension Department, south side of	19	St. Joseph's College	36
Extension Library, west entrance of	33	St. Stephen's College	39
Fine Arts	15	Soil Science	3
Garages	21	Soil Survey	3
Gateway Office	35	South Laboratory Building	19
Geography	15	Staff Apartments	43
Geology	3	Superintendent of Buildings	29
Graduate Studies, Dean	31	Student Counselling Services	31
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Grounds Department	17, 22	Summer Session, Director, Room 219	59
Gymnasium	34	Surgery and Clinical Surgery	52
History, 2nd floor of	15	Telephone Switchboard, basement of	31
Household Economics, north entrance of	19	University Elementary School,	59
Hydraulics	16	University Hospital: Main Building	52
Industrial Laboratories, east entrance of	37	Van de Graaf Building	1
Infirmery	37	West Laboratory Building	30
Law, 2nd floor of	15	Works Department	28
Library	33	Zoology	3

In case of emergency, notify Power Plant (26).

For other information, apply to the office of the Bursar, Administration Building.

1960							CALENDAR							1960						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
JANUARY							FEBRUARY							MARCH						
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3	4	5	6	7	8	9	7	8	9	10	11	12	13	6	7	8	9	10	11	12
10	11	12	13	14	15	16	14	15	16	17	18	19	20	13	14	15	16	17	18	19
17	18	19	20	21	22	23	21	22	23	24	25	26	27	20	21	22	23	24	25	26
24	25	26	27	28	29	30	28	29						27	28	29	30	31		
31																				
MAY							JUNE							JULY						
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8	9	10	11	12	13	14	5	6	7	8	9	10	11	3	4	5	6	7	8	9
15	16	17	18	19	20	21	12	13	14	15	16	17	18	10	11	12	13	14	15	16
22	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	20	21	22	23
29	30	31					26	27	28	29	30			24	25	26	27	28	29	30
														31						
SEPTEMBER							OCTOBER							NOVEMBER						
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4	5	6	7	8	9	10	2	3	4	5	6	7	8	6	7	8	9	10	11	12
11	12	13	14	15	16	17	9	10	11	12	13	14	15	13	14	15	16	17	18	19
18	19	20	21	22	23	24	16	17	18	19	20	21	22	20	21	22	23	24	25	26
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1961							CALENDAR							1961						
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JANUARY							FEBRUARY							MARCH						
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8	9	10	11	12	13	14	12	13	14	15	16	17	18	12	13	14	15	16	17	18
15	16	17	18	19	20	21	19	20	21	22	23	24	25	19	20	21	22	23	24	25
22	23	24	25	26	27	28	26	27	28					26	27	28	29	30	31	
29	30	31																		
MAY							JUNE							JULY						
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7	8	9	10	11	12	13	4	5	6	7	8	9	10	2	3	4	5	6	7	8
14	15	16	17	18	19	20	11	12	13	14	15	16	17	9	10	11	12	13	14	15
21	22	23	24	25	26	27	18	19	20	21	22	23	24	16	17	18	19	20	21	22
28	29	30	31				25	26	27	28	29	30		23	24	25	26	27	28	29
														30	31					
SEPTEMBER							OCTOBER							NOVEMBER						
					1	2										1	2	3	4	5
3	4	5	6	7	8	9	8	9	10	11	12	13	14	5	6	7	8	9	10	11
10	11	12	13	14	15	16	15	16	17	18	19	20	21	12	13	14	15	16	17	18
17	18	19	20	21	22	23	22	23	24	25	26	27	28	19	20	21	22	23	24	25
24	25	26	27	28	29	30	29	30	31					26	27	28	29	30		
DECEMBER																				
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1962							CALENDAR							1962						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
JANUARY							FEBRUARY							MARCH						
										1	2	3				1	2	3		
7	8	9	10	11	12	13	4	5	6	7	8	9	10	4	5	6	7	8	9	10
14	15	16	17	18	19	20	11	12	13	14	15	16	17	11	12	13	14	15	16	17
21	22	23	24	25	26	27	18	19	20	21	22	23	24	18	19	20	21	22	23	24
28	29	30	31				25	26	27	28				25	26	27	28	29	30	31
MAY							JUNE							JULY						
											1	2				1	2	3	4	5
6	7	8	9	10	11	12	3	4	5	6	7	8	9	8	9	10	11	12	13	14
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21
20	21	22	23	24	25	26	17	18	19	20	21	22	23	22	23	24	25	26	27	28
27	28	29	30	31			24	25	26	27	28	29	30	29	30	31				
SEPTEMBER							OCTOBER							NOVEMBER						
																1	2	3		
2	3	4	5	6	7	8	7	8	9	10	11	12	13	4	5	6	7	8	9	10
9	10	11	12	13	14	15	14	15	16	17	18	19	20	11	12	13	14	15	16	17
16	17	18	19	20	21	22	21	22	23	24	25	26	27							

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ACADEMIC SCHEDULE

1960-61

1960

July—

Friday, 1—

Fifty-fourth year begins.

Monday, 4—

Summer Session supplemental examinations.

8:30 a.m.—Registration of Summer Session students.

1:00 p.m.—Summer Session lectures begin.

Friday, 15—

Last day for application for Graduate degrees to be conferred at Fall Convocation.

August—

Saturday, 13—

Summer Session ends.

Wednesday, 31—

Last day for receiving applications from residents of Canada for admission to the faculty of Graduate Studies. No assurance can be given that late applications will be dealt with in time for registration.

September—

Monday, 5—

Labor Day; University buildings closed.

Saturday, 10—

Last day for receiving registrations in the Evening Credit Program (including students in the Faculty of Graduate Studies).

Thursday, 15—

Last day for submission of theses by graduate students expecting to receive their degrees at Fall Convocation.

Monday, 19—

First day for registration of students in the Faculty of Graduate Studies.

Friday, 23—

8:30 a.m.—Lectures begin.

Monday, 26—

Evening Credit Program classes begin.

October—

Saturday, 1—

Last day for oral examinations of Masters and Doctoral candidates for Fall Convocation.

Last day for registration of part-time and special students and of students in the Faculty of Graduate Studies (extramural and intramural) except those in Evening Credit Program (see September 10).

Last day for filing of applications under the Students Assistance Act.

Monday, 10—

Thanksgiving Day; University Buildings closed.

Saturday, 22—

Notice of intention to be absent from Fall Convocation must be given by 12:00 noon.

Saturday, 29—

(Afternoon)—Fall Convocation (to be held in Calgary).

November—

Monday, 14 to Saturday, 19—

Test Week*.

December—

Thursday, 15—

Last day for receipt of applications for certificates of Post-Graduate Qualification in Medicine.

Thursday, 22—

Last day of lectures before Christmas vacation.

Friday, 23—

Christmas vacation begins.

1961

January—

Monday, 2—

Christmas vacation ends.

Tuesday, 3—

8:30 a.m.—First term lectures resume.

Last day for filing second term applications for grants and loans under the Students' Assistance Act.

Saturday, 7—

Last day of lectures in the first term except in the D.D.S. and M.D. programs

Monday, 9 to Saturday, 14—

Mid-session examinations except in the D.D.S., the LL.B. and the M.D. programs.*

Thursday, 12—

Second term lectures begin.

Monday, 16—

Last day for payment of second instalment of fees.

February—**Wednesday, 1—**

Last day of application for Graduate Degrees to be conferred at Spring Convocation.

Monday, 13 to Saturday, 18—

Test Week*.

March—**Friday, 31—**

Good Friday; University Buildings closed.

April—**Saturday, 1—**

Last day for submission by graduate students of theses.

Last day for receipt of applications for admission from new students, undergraduate or graduate, who wish to enter the University in the 1961 Summer Session.

Friday, 14—

Last day for oral examinations for Master and Doctoral candidates for Spring Convocation.

Saturday, 15—

Last day of lectures for graduate students in departments of the Faculties of Arts and Science, Agriculture, Education, and Pharmacy.

Saturday, 29—

Last day for registration of students in the Summer Session.

May—**Wednesday, 3—**

Notice of intention to be absent from Convocation must be given by 12:00 noon.

Tuesday, 9—

Charter Day.

Thursday, 25—

Convocation for the conferring of degrees and diplomas.

June—**Friday, 30—**

Fifty-fourth University year ends.

***Students will not be granted permission to leave the campus for extramural activities during test weeks.**

ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

- President of the University—Walter Hugh Johns, B.A., Ph.D.
 Vice-President—Laurence Harold Cragg, M.A., Ph.D., F.C.I.C.
 Principal, University of Alberta in Calgary—Malcolm G. Taylor, M.A., Ph.D.
 Assistant to the President and Provost—Aylmer Arthur Ryan, M.A.
 Dean of the Faculty of Arts and Science—Douglas Elstow Smith, M.A., Ph.D.
 Dean of the Faculty of Law—Wilbur Fee Bowker, Q.C., B.A., LL.B., LL.M.
 Dean of the Faculty of Engineering—George Wheeler Govier, B.A.Sc., M.Sc., Sc.D.
 Dean of the Faculty of Medicine—Walter Campbell MacKenzie, B.Sc., M.D., C.M., M.S., F.A.C.S., F.R.C.S.(C.).
 Dean of the Faculty of Agriculture—Charles Fred Bentley, M.Sc. Ph.D.
 Dean of the Faculty of Education—Herbert Thomas Coutts, B.A., M.A., Ph.D.
 Dean of the Faculty of Dentistry—Hector Robert MacLean, D.D.S., F.A.C.D., F.I.C.D.
 Dean of the Faculty of Pharmacy—Mervyn James Huston, M.Sc., Ph.D.
 Dean of the Faculty of Graduate Studies—Arthur Gilbert McCalla, M.Sc., Ph.D., F.R.S.C.
 Director of the School of Nursing—Ruth Elizabeth McClure, B.Sc., M.P.H., R.N.
 Director of the School of Household Economics—Hazel McIntyre, B.Sc., M.S.
 Director of the School of Commerce—Hubert William Harries, B.Sc., M.Sc., M.A., Ph.D.
 Director of the School of Physical Education—Maurice Lewis Van Vliet, B.S., M.S., Ed.D.
 Director of the School of Physical Therapy and Occupational Therapy—John Richard Fowler, M.D.
 Director of the Banff School of Fine Arts—Donald Cameron, M.Sc.
 Director of Extension—Darroch Duncan Campbell, B.Com., B.A.
 Assistant Director, Banff School—John Christian Kenneth Madsen, B.Com.
 Director of the Summer Session and of the Evening Credit Program—John William Gilles, M.A., M.Ed., Ed.D.
 Associate Dean, Faculty of Education, Calgary—Andrew Leo Doucette, B.Sc., M.A., Ed.D.
 Administrative Officer, Faculty of Arts and Science, Calgary—Earl Frederick Guy, M.A., Ph.D.
 Director of Student Counselling Services—Alexander Joseph Cook, B.Sc., M.A., Ph.D.
 Counselling Services, Calgary—Helen Isobel McWilliam, B.A.
 Provost, Calgary—John Douglas Aikenhead, B.Sc., A.M., Ed.D.
 Dean of Women—Mrs. J. Grant Sparling, B.A., Dip.S.W.
 Librarian to the University—Bruce Braden Peel, M.A., B.L.S.
 Superintendent of the University Hospital—Angus Cecil McGugan, M.D., D.P.H.
 Registrar of the University—Alexander Duncan Cairns, B.A.
 Associate Registrar and Assistant to the Principal, Calgary—Harold Richard Hawes, B.Sc.
 Assistant Registrar—Lynn Parkes Morgan, B.A.
 Alumni Secretary—Alexander Gilmour Markle, B.A., B.J.
 Bursar of the University—John MacLean Whidden, B.Com.
 Accountant—Murray Alexander Rousell, B.Com., C.A.
 Purchasing Agent—Edward Frederick Hunter, B.Com.
 Assistant Accountant—Albert Stephen Knowler, B.Com.
 Warden of Athabasca Hall—Douglas John Sherbaniuk, B.A., LL.B.
 Warden of Assiniboia Hall—
 Personnel Officer—Murray Stewart Cooke, B.S.A.
 Superintendent of Buildings—Beverly Whitmore Brooker, B.Sc.
 Administrator of Student Awards—Robert Barry Wishart, B.Com.

COUNCIL OF THE FACULTY OF GRADUATE STUDIES

- WALTER HUGH JOHNS, B.A. (Western Ontario), Ph.D. (Cornell), President of the University.
- ARTHUR GILBERT McCALLA, M.Sc. (Alberta), Ph.D. (California), F.R.S.C., Professor of Plant Science and Dean of the Faculty of Graduate Studies.
- MERVYN JAMES HUSTON, M.Sc. (Alberta), Ph.D. (Washington), F.C.I.C., Professor and Dean of the Faculty of Pharmacy.
- HAROLD STEWART BAKER, B.A. (Toronto), M.A. (Alberta), Ph.D. (Columbia), L.A.B. (Royal Schools), Professor and Chairman, Division of Secondary Education.
- HERBERT BRUCE COLLIER, M.A., Ph.D. (Toronto), F.R.S.C., Professor of Biochemistry.
- GEORGE MURRAY DUNLOP, B.A. (Saskatchewan), M.A. (Alberta), Ph.D. (Columbia), Professor of Education and Chairman, Division of Educational Psychology.
- JAMES ALAN LONGMORE GILBERT, M.B., Ch.B., M.D., F.R.C.P. (Edinburgh), M.R.C.P. (London), F.R.C.P.(C.), Associate Professor of Medicine.
- HUGH GRAYSON-SMITH, M.B.E., M.A., Ph.D. (Toronto), F.R.S.C., Professor of Physics.
- EDWARD JOSEPH HOLLINGSWORTH GREENE, M.A. (Alberta), Docteur de l'Université de Paris, Professor of French.
- HARRY EMMET GUNNING, M.A., Ph.D. (Toronto), Professor of Chemistry.
- ERIC JOHN HANSON, B.A. (Queen's), M.A. (Alberta), Ph.D. (Clark), Professor of Economics.
- BRIAN HOCKING, B.Sc., Ph.D. (London), M.Sc. (Alberta), A.R.C.Sc., Professor of Entomology.
- LAIRD WARD McELROY, M.Sc. (Alberta), Ph.D. (California), Professor of Animal Science.
- JAMES GORDON PARR, B.Sc. (Leeds), Ph.D. (Liverpool), Professor of Metallurgy.
- JAMES WILLIAM PEARCE, M.D., C.M. (Queen's), D.Phil. (Oxon.), Professor of Physiology.
- ARTHUR W. REEVES, B.A. (Alberta), M.A. (Chicago), Ed.D. (Stanford), Professor and Chairman, Division of Educational Administration and Supervision.
- DONALD BAKER ROBINSON, M.A.Sc. (British Columbia), Ph.D. (Michigan), Professor of Chemical Engineering.
- FREDERICK MILLET SALTER, B.A. (Dalhousie), M.A. (Chicago), D.Litt. (Toronto), F.R.S.C., F.R.S.L., Professor of English.
- STEWART RONALD SINCLAIR, M.Sc. (Alberta), Professor of Civil Engineering.
- CHARLES RICHARD STELCK, M.Sc. (Alberta), Ph.D. (Stanford), Professor of Geology.
- LEWIS GWYNNE THOMAS, M.A. (Alberta), Ph.D. (Harvard), Professor of History.
- JOHN ALFRED TOOGOOD, B.Sc. (Alberta), Ph.D. (Minnesota), Professor of Soil Science.
- JOHN UNRAU, B.S.A., M.Sc. (Saskatchewan), Ph.D. (Washington), Professor of Plant Science.
- MAX WYMAN, B.Sc. (Alberta), Ph.D. (California Institute of Technology), F.R.S.C., Professor of Mathematics.
- ALEXANDER DUNCAN CAIRNS, B.A. (Alberta), Registrar.

N O T I C E
TO ALL STUDENTS

It is the student's responsibility to ensure that he is properly registered and that he meets the various requirements of the Faculty as he proceeds in his program. This calendar contains full information concerning the regulations of the Faculty and it is assumed that students will read the calendar. Please note particularly:—

1. The "Academic Schedule", p. 7, lists a number of deadline dates.
2. The "General Regulations", pp. 27-29, give the details regarding admission, registration, academic standards, theses and examinations.
3. The "Time Limit", of six years, p. 29, was introduced in 1953 and applies fully to all students who are now registered or who have started programs in the Faculty.
4. Students who ignore deadlines or fail to meet the requirements of the Faculty will be delayed in their programs and probably in the time of graduation.

A. G. McCALLA,
Dean

FACULTY OF GRADUATE STUDIES

Graduate work has been offered at the University of Alberta since its inception in 1908. During recent years the numbers of graduate students have increased rapidly, particularly in the programs leading to doctoral degrees. The present organization of the Faculty with a Dean was adopted in 1957.

The degrees offered by the Faculty are the Master of Arts, Master of Education, Master of Science, Doctor of Education and Doctor of Philosophy. All of these are based on programs of study including a thesis project. The Doctor of Letters and Doctor of Science degrees are awarded for outstanding achievement in the humanities or sciences. In 1959 the degrees awarded included 15 M.A., 27 M.Ed., 46 M.Sc., 8 Ph.D., and 1 D.Sc. There were 581 students registered in the Faculty in 1959-60.

The University has continually expanding facilities for advanced study and research, and a steadily growing staff to provide direction in graduate programs.

UNIVERSITY REGULATIONS

All students in attendance at the University must become familiar with and keep informed of the regulations as published in the University Calendar, and as posted on the official notice boards from time to time.

FEES

GENERAL FEES

Registration	\$ 8.00
Medical Services, optional at registration	12.00
Students' Union and University Athletic Board, optional at registration	28.25

INSTRUCTION FEES

Students who have already started masters' programs will note that the method of assessing fees has been changed. Assessment of fee balances under the new system will not change the total fee for any student who completes his program in the normal time.

Full-time Students

Except where otherwise noted, each fee quoted in the following schedule is the current total instruction fee for the minimum period during which it is possible to complete the degree program. The University reserves the right to change fees without notice. Students who have not completed their programs when a change is made will pay at the new rate for the balance of their programs.

D.Sc. or D.Litt. degree	\$200.00
Ph.D. or Ed.D. degrees (Holders of Master's degree) \$200.00 a year for two years	400.00
Ph.D. or Ed.D. degrees (Holders of Bachelor's degree) \$200.00 a year for three years	600.00
Masters degrees (Holders of Bachelor's degree with honors or of the B.Sc. degree from a four-year undergraduate program) one year at	200.00
Masters degrees (Holders of the B.Ed. degree or of any Bachelor's	

degree from a three-year undergraduate program) one year at \$200.00 and one at \$100.00	300.00
Master of Education degrees for which residence credit is obtained at Summer Session, three sessions at \$100.00	300.00
Subsequent years for all doctoral and masters' candidates	
Extramural	15.00
Intramural	30.00

Special and Conditional graduate students taking courses other than those credited toward a degree program will be assessed \$55.00 per full course and \$30.00 per half course to a maximum of the fee for a full year's program of senior work in the appropriate faculty.

Part-time Students

Part-time students in all categories will be assessed \$55.00 per full course and \$30.00 per half course up to the amount of the total instruction fee for the full program. Part-time students will be subject to an extra assessment of \$15.00 (extramural) or \$30.00 (intramural) for each registration in excess of three. Any outstanding balance will be assessed in the student's final session.

FELLOWSHIPS AND SCHOLARSHIPS

The following Scholarships and Fellowships are awarded primarily on a basis of academic standing. In general, awards are made only to applicants whose previous academic standing is either First Class or high Second Class.

Unless otherwise stated awards are for one year only, but application for renewal will be considered.

In order that awards may be equitably distributed, no student may hold more than one major scholarship award in a given year, that is, an award equal to or exceeding \$1,200.00 in value. No award will be given to any student who is not a full-time student. (A full-time student may carry a teaching load of six hours per week, but holders of major awards may not accept a teaching or other assignment involving more than a total of the equivalent of four hours a week during the academic session.)

The following awards are open in two or more Fields of Study:

University of Alberta Graduate Fellowship—This is the senior fellowship within the faculty and is valued at \$3,600 on a twelve-month basis. It is open to a student who has completed at least one year of graduate study and registers for a full-time program leading to either a Ph.D. or Ed.D. degree. An award winner is expected to carry out a full-time research program during the summer months. Tenure may begin at any time from May 1 to October 1.

Apply to Administrator of Student Awards by March 1.

Province of Alberta Graduate Fellowships. Three Fellowships valued at \$3,600 each, on a twelve-month basis, are open to students who have completed at least one year of graduate study and register for a full-time program leading to either a Ph.D. or Ed.D. degree. Award winners are expected to carry out a full-time research program during the summer months. Tenure may begin at any time from May 1 to October 1.

Apply to Administrator of Student Awards by March 1.

Province of Alberta Graduate Scholarships. Ten scholarships valued at \$2,600 or \$2,200 each on a twelve-month basis, are open to students in any year of graduate study. Normally awards of \$2,600 will be made only to students who have completed at least one year of graduate work. The usual award for students during the first year of graduate study will be \$2,200.

These scholarships are intended to encourage winners to do full-time research during the summer months but the twelve-month term of award is not obligatory. Tenure may begin at any time from May 1 to October 1, and may be terminated by either the student or the University at any time after the end of the academic year. In case the scholarship is held for less than twelve months, the amount will be reduced proportionately.

Apply to Administrator of Student Awards by March 1.

Province of Alberta Tuition Bursaries. Twenty-five bursaries, covering the total fee assessment for the year of the award, are open to students who carry a full program of studies for any year of graduate study. Financial need will be considered in awarding these bursaries. They may be held in conjunction with other scholarships and graduate assistantships. These bursaries will not be awarded to students whose total fee assessment is less than two hundred dollars.

Apply to the Administrator of Student Awards by August 15.

The Francis F. Reeve Foundation Graduate Bursaries. The Francis F. Reeve Foundation offers three Graduate Bursaries valued at \$2,400 each on a twelve month basis. The awards are open to graduates of any university who are engaged in, or admissible to, a program leading to a graduate degree at the University of Alberta in any field of study for which facilities are available, and will be made on the basis of scholastic attainment and financial need. Tenure may begin at any time from May 1 to October 1.

Apply to Administrator of Student Awards by March 1.

The Francis F. Reeve Foundation Interession Bursaries. The Francis F. Reeve Foundation offers six Interession Bursaries valued at \$800 each. The awards are open to graduates of any university who are already engaged in a program leading to a graduate degree at the University of Alberta in any field of study for which facilities are available, and who are prepared to spend at least four months of the Interession on research. Holders of twelve-month awards are not eligible. Awards will be made on the basis of scholastic attainment and financial need. Tenure must begin not later than June 1. While any student may apply, preference will be given to those in the humanities, social sciences and education.

Apply to Administrator of Student Awards by March 1.

Graduate Teaching Fellowships valued at \$2,400.00 for an eight-months appointment or \$3,600.00 for twelve months are available in the Departments of Botany, Chemistry, English, Geology, Mathematics, Physics and Zoology. Eight-month appointments cover the period September 15 to May 15. Twelve-month appointments may be started any time between May 15 and September 15. The period May 15 to September 15 will be free for full-time research. Of these Fellowships, several are provided from funds contributed by the International Nickel Company of Canada.

Applicants must hold a bachelor's degree and be admissible to the Faculty of Graduate Studies as candidates for either the Ph.D. or Master's degree. Preference will be given to applicants who have already completed some graduate work.

Apply to Administrator of Student Awards by March 1.

The C.I.L. Fellowship—A fellowship of \$2,000.00 per year plus \$400.00 supplementary grant to the University is offered by Canadian Industries Limited for study and research leading to a doctorate degree in Chemistry or Chemical Engineering. The fellowship will be open to university graduates who are Canadian citizens or to university graduates who are intending to follow a career in Canada, with preference to Canadian citizens. Upon completion of the year's work, the fellow shall submit to Canadian Industries Limited a written report outlining work performed under the fellowship or alternatively a copy of the thesis prepared for his degree. Each award shall be in respect of one year, but, in the event that a fellow shows by his progress and application that such a course is desirable, the fellowship may be awarded to the same person for a further term of one year.

A statement that the proposed research project could be carried forward satisfactorily at the University of Alberta is required from the head of the university department within which it would be conducted.

Apply to Administrator of Student Awards by March 1.

The Shell Oil Fellowship—An annual fellowship consisting of \$1,800.00 to the student selected and a grant of \$500 to the University, has been provided by the Shell Oil Company to sponsor research studies in Chemistry, Chemical Engineering, Mechanical Engineering, Petroleum Engineering, Geology, Physics or Geophysics leading to a postgraduate degree at the University of Alberta. The sum of \$1,200.00 will be paid towards the fellow's living expenses and fees for the normal academic year; in cases where the fellow may be occupied in his postgraduate work for a full calendar year, a further \$600.00 may be made available for the remaining four months. The fellowship is open annually to: (1) any science or engineering graduate of an approved Canadian university who intends to follow a career in Canada; or (2) any science or engineering graduate of an approved university who has had at least one year postgraduate study at a Canadian university and who has previously made clear his intentions to follow a career in Canada. In cases where the fellow is engaged in postgraduate studies leading to a Ph.D. degree, the fellowship may be awarded for a second year to the same person.

A statement to the effect that the proposed research project could be carried forward satisfactorily at the University of Alberta is required from the head of the university department within which it would be conducted.

Apply to Administrator of Student Awards by March 1.

The Cominco Fellowship—The Consolidated Mining and Smelting Company of Canada, Limited, offers a fellowship of \$1,000.00 per year to graduates in Science, Engineering or Agriculture of a recognized university, and preferably a Canadian citizen or other British subject resident in Canada, for research at the University of Alberta in some field of pure or applied science preferably related to the mining, metallurgical or chemical industry in which the company is interested. An additional sum of \$500.00 is available for special equipment and supplies.

Apply to Administrator of Student Awards by March 1.

The California Standard Company Graduate Fellowship, valued at \$1,000.00 is offered by the California Standard Company to a student of the University of Alberta to undertake first-year graduate study at the University of Alberta, for research in geology, geological engineering, petroleum engineering or geophysics. The field of study should be related to oil exploration and production. A supplementary grant of \$500 will be made to the department in which the fellow is pursuing graduate studies.

A statement that the proposed study could be carried forward satisfactorily at the University is required from the head of the university department concerned.

Apply to Administrator of Student Awards by March 1.

The Robert Tegler Research Scholarship—One research scholarship of the value of \$900.00 for work to be carried on at the University of Alberta is offered by the Robert Tegler Trust. This scholarship is open to graduates of the University of Alberta. The financial need of the candidate, together with other qualifications will be considered.

Apply to Administrator of Student Awards by March 1.

The Stapells Graduate Scholarship valued at \$250.00 is offered by Mr. Frederick Stapells for graduate study in languages or literature or the social sciences at the University of Alberta. The scholarship is restricted to graduates of the University of Alberta, and will be paid only when the recipient registers for a full intramural graduate program.

Apply to Administrator of Student Awards by March 1.

The Henry Marshall Tory Memorial Scholarship of \$300.00 is offered by the University of Alberta Alumni Association in honor of the first President of the University. It is intended to promote graduate study and research in fields related to mental health. It is restricted to graduates of the University of Alberta and will be paid only when the recipient registers for a full intramural program at the University of Alberta or at another approved graduate school.

Apply to Administrator of Student Awards by March 1.

The William Rea Scholarship in Television—Beginning with the year 1959, a scholarship of \$1,000 will be offered annually by William Rea, Jr. in honor of his father, a pioneer Edmonton educator. The scholarship is open to a University of Alberta graduate or graduating student of either sex, who shows the best aptitude in terms of scholarship and extra-curricular activity for a television career in drama, music, writing, photography, engineering or business. The student may attend any recognized graduate school which will further his training in this area, and the scholarship may be renewed for one or more years in appropriate circumstances.

Definite details should be given as to the field of study in which the candidate desires to work.

Apply to Administrator of Student Awards by March 1.

The following awards are open in one Field of Study only (as listed alphabetically):

AGRICULTURE

Canadian Sugar Factories Scholarship—A scholarship valued at \$500.00, open to graduates in Agriculture of the University of Alberta, is offered by Canadian

Sugar Factories Limited, Raymond, Alberta. This scholarship is provided to encourage research in agriculture at the University of Alberta and in carrying out this objective special consideration will be given to a problem or problems relating to irrigation farming.

Apply to Administrator of Student Awards by March 1.

The Dan Baker Scholarships are provided under the terms of the will of the late Dan Baker of Edmonton, Alberta, which founded a trust to provide scholarships in the Faculty of Agriculture. The Scholarships are open either to undergraduates who have completed at least one year of their course or to agricultural graduates of the University of Alberta who are carrying on research leading to a postgraduate degree in the Faculty of Graduate Studies at the University of Alberta.

The Scholarships are available only to students who could not pursue their studies without financial aid and who are of such ability and academic standing as to be worthy of assistance. Such matters as personality, character, and other relevant points will also be taken into account in making the award.

Two scholarships of the value of \$300.00 each will be available. Applications should reach the Administrator of Student Awards by June 15.

The Robert Gardiner Memorial Scholarships are offered by the United Farmers of Alberta in memory of the late Robert Gardiner.

The scholarships are open only to students from farm homes; preference will be given to students born in Alberta.

One research scholarship to the value of \$100.00 will be open to members of the graduating class or to graduates who are proceeding to postgraduate work in Agriculture in the Faculty of Graduate Studies, University of Alberta.

Apply to Administrator of Student Awards by March 1.

CHEMISTRY

The Professor Osman James Walker Memorial Scholarship is awarded annually to the student selected by the Department of Chemistry who is graduating from the University of Alberta in the general or honors program and who will be proceeding to graduate work in the Department of Chemistry at the University of Alberta. Applications for this award must be received by the Department before May 1.

In the event that no suitable applicant is selected, the award will go to the student graduating with the highest record in the honors chemistry program.

The Cave and Company, Ltd. Scholarship in Chemistry of the value of \$150 is awarded annually to a student selected by the Department of Chemistry who is graduating from the University of Alberta in the general program or honors program or in Chemical Engineering, and who will be proceeding to graduate work in the Department of Chemistry at the University of Alberta. Applications for this award must be received by the Department before May 1.

In the event that no suitable applicant is selected, the award will go to the student in the third year of the honors Chemistry program, with the highest academic standing.

EDUCATION

The Clarence Sansom Scholarship in Education, in the amount of \$500, is offered annually by The Alberta Teachers' Association to the winner of the Clarence Sansom Memorial Gold Medal in Education. The scholarship is payable upon registration for intramural graduate study during a regular winter session in the graduate school of a university of recognized standing, provided that such study be commenced not later than two years following the award.

The John Walker Barnett Scholarship in Education and the Milton Ezra LaZerte Scholarship in Education, each in the amount of \$500, are offered annually to students who, having graduated with a Bachelor of Education degree from the University of Alberta, are proceeding to graduate work. Each applicant must be a bona fide resident of Alberta. He must give evidence of superior academic and professional promise, capacity for leadership, and intention to follow teaching as a career. The scholarship is payable upon registration for intramural study during a regular winter session in the graduate school of a university of recognized standing, provided that such study be commenced not later than two years following the award. Application should be made to the General Secretary, Alberta Teachers' Association, Barnett House, Edmonton, not later than May 15.

The Du Pont Company of Canada Limited offers a scholarship of \$1,500 to be awarded to: *either* (1) a graduate or graduating student in an honors course in science or Mathematics, or in a course in which science or mathematics has been a major subject, and who agrees to enrol for training as a secondary school science or mathematics teacher; *or* (2) a science or mathematics specialist already teaching in the secondary school and whose ability to teach science or mathematics would be improved by a year's postgraduate work. Both men and women are eligible. The scholarship is increased by \$600 if the student is a married man. A supplementary grant of \$300 will be paid to the University.

Detailed information and application forms are available from the office of the Dean, Faculty of Education, University of Alberta. Applications will be received at the same office until June 15.

Fellowships Sponsored by The Canadian Education Association.

The Imperial Oil Company Limited Fellowship in Educational Administration of \$2,400.

The Canadian Text Book Publishers Fellowship in Educational Administration of \$2,400.

The International Nickel Company of Canada Limited Fellowship in Educational Administration of \$2,400.

The above fellowships, sponsored by the Canadian Education Association, are tenable at the University of Alberta by graduate students working at the Master's or Doctor's level. Applications for these fellowships should be made before March 1 on forms available from the Chairman, Division of Educational Administration and Supervision, Faculty of Education, University of Alberta.

The W. K. Kellogg Foundation Fellowships in Educational Administration—A number of fellowships in amount up to \$2,400 are donated by the W. K. Kellogg Foundation, Battle Creek, Michigan. These are tenable at the University

of Alberta by graduate students working on the Master's or Doctor's level. Successful applicants will also receive travel assistance to help defray the cost of transportation to Edmonton and to cover expenses involved in field projects. Applications accompanied by transcripts of academic record and the names of three suitable references should be sent to Dr. A. W. Reeves, Chairman, Division of Educational Administration, Faculty of Education, University of Alberta, by March 1.

The Carnegie Corporation Fellowships in Educational Research—Three fellowships, two of \$2,500 and one of \$1,500, donated by the Carnegie Corporation, are tenable at the University of Alberta by graduate students working at the Master's or Doctor's level in Educational Research. Applications accompanied by transcripts of academic record and the names of three suitable references should be sent to the Dean, Faculty of Education, University of Alberta, by March 1.

The Alberta Teachers' Association Fellowship in Education of \$2,400 is offered to residents of Alberta, who are members of the Alberta Teachers' Association, and who are admitted to the Faculty of Graduate Studies of the University of Alberta for intramural study at a regular winter session on a doctoral program in education. This fellowship is open to students enrolled for doctoral work in any one of the four divisions of the Faculty of Education. Application forms are obtainable from the General Secretary, Alberta Teachers' Association, Barnett House, Edmonton and should be returned by March 15.

ENGINEERING

The Pan American Petroleum Corporation Graduate Fellowship in Petroleum Engineering valued at \$1,200.00 plus tuition and fees is offered by the Pan American Petroleum Corporation (formerly Stanolind Oil and Gas Company) to a student holding the B.Sc. degree in Engineering from any recognized university for graduate study and research at the University of Alberta in Petroleum Engineering.

Applications should be made to the Administrator of Student Awards before March 1, and should include a complete record of undergraduate work and any graduate work previously taken by the applicant.

GEOLOGY

The Pan American Petroleum Corporation Graduate Fellowship in Geology—A fellowship of the value of \$1,200 plus fees is offered by the Pan American Petroleum Corporation (formerly Stanolind Oil and Gas Company) for graduate study in the field of Geology at the University of Alberta. This fellowship is open to graduates of any Canadian University.

Apply to Administrator of Student Awards by March 1.

MEDICINE

The Alberta Tuberculosis Association Fellowship of \$1,200.00 and a one-year subscription to the American Review of Tuberculosis are offered annually to a recent graduate in Medicine, who is eligible for license to practise, for the purpose of acquiring training in the field of Thoracic Diseases. It is stipulated that the holder of the Fellowship shall spend a year of study or research in Alberta, in a program

approved by the Faculty of Medicine and the Association. The Faculty of Medicine will consult with the Association in awarding this Fellowship.

Apply to Administrator of Student Awards by March 1.

The Doctor D. S. Macnab Bursary—The Calgary Associate Clinic has founded the Doctor D. S. Macnab Bursary of \$250.00 available to recent graduates for the purpose of giving aid to postgraduate studies or research in Medicine or Surgery. Under special circumstances, it may be given to undergraduates.

It will be awarded by the Faculty of Medicine, and applications should be forwarded to the Administrator of Student Awards by March 1.

The Dorothy Jean Usher Memorial Scholarship for Medical Research—The Dorothy Jean Usher Memorial Scholarship for Medical Research consists of the income from a capital endowment of \$10,000.00, given by Thomas Usher in memory of his daughter, a graduate of the University of Alberta School of Nursing. It is offered to a graduate or an undergraduate for research work in the Faculty of Medicine of the University of Alberta on some aspect of medicine, with preference given to investigations relating to leukaemia.

Applications should be made to Administrator of Student Awards by March 1.

PHARMACY

The Warner-Lambert Graduate Fellowship of the value of \$1,200 is offered annually by the Warner-Lambert Company of Canada for five years, beginning 1958, to a student of outstanding merit undertaking graduate work in Pharmacy. A supplementary grant of \$300 for equipment and supplies will also be made to the Faculty of Pharmacy.

The Pfizer Research Scholarship of the value of \$300.00 is offered annually to a student of outstanding merit undertaking graduate work in Pharmacy.

AWARDS MADE BY OTHER INSTITUTIONS

The attention of students is directed to the list of awards made by other institutions which are outlined in detail in the Awards Calendar. A few of these are noted below:

The Canada Council Awards—These are provided in the fields of the arts (defined as architecture, the arts of the theatre, literature, music, painting, sculpture, the graphic arts and other similar creative and interpretative activities), the humanities and the social sciences.

The awards are in ten categories. The three which are of most interest to students are:—

1. Pre-Master's Scholarships. Tenable in Canada. Value \$1,500. Apply to Canada Council by November 15.
2. Pre-Doctor's Fellowships. Tenable in Canada or abroad. Value \$2,000 plus allowances for necessary travel. Apply to Canada Council by January 10.
3. Grants-in-Aid of research. Apply to Canada Council by January 20.

Further information may be obtained from the Administrator of Student Awards or by writing direct to The Canada Council, 140 Wellington St., Ottawa.

The Commonwealth Scholarship and Fellowship Plan. Under the Commonwealth Scholarship and Fellowship Plan various Governments within the Commonwealth are providing scholarships and fellowships, mainly for postgraduate work, tenable in their countries by men and women from other parts of the Commonwealth. It is expected that there will be at least one thousand such awards. Each country will accept a given number of students and will make the awards for these, and will decide the distribution, within the Commonwealth, of the countries from which they will invite applicants. It is anticipated that the United Kingdom will offer 500 and Canada 250.

Scholarships will normally be for a period of two years and will likely cover all travel and other expenses.

Applications will be accepted by and screened by the agency set up for this purpose in the sending country, but final selection will be made by the receiving country.

It is expected that the final application date for the 1961-62 session may be December 31, 1960, but interested students should enquire early.

Apply for information to Administrator of Student Awards.

The National Research Council Scholarships—The National Research Council offers annually postgraduate scholarships on a twelve months basis to graduates with pre-eminent ability in the sciences, mathematics, engineering, and applied psychology. Those tenable in Canada are as follows: Bursaries (in Canada only) to the value of \$1,800; Studentships (in Canada only) to the value of \$2,200. The above amounts were those in effect for the 1959-60 session.

In all cases a travel allowance is made where necessary.

Application forms and general regulations may be secured from the Administrator of Student Awards, University of Alberta. Completed applications must be received by the Council in Ottawa by February 1.

Canadian Good Roads Association Scholarships—Several scholarships, each valued at \$2,000.00 and tenable for one year, are offered annually through the Canadian Good Roads Association for graduate study in Transportation Engineering.

Applications should reach the Association at 270 McLaren Street, Ottawa, not later than April 15.

Further information may be obtained from the office of the Dean, Faculty of Engineering.

C-I-L Wildlife Management Fellowships—Fellowships of the value of \$1,500, of which \$1,200 is paid to the student and \$300 to the Department in which the student is working, are available to any university graduate undertaking postgraduate studies in wildlife management at a Canadian university. Fellowship holders may receive summer grants to finance field work and provide additional income.

Applications should be forwarded by March 30 to Mr. S. J. Smart, Secretary of the Advisory Board, P.O. Box 10, Montreal.

The Franki Fellowship, of \$1,750.00 per year plus \$250.00 to cover expenses in connection with the research, is offered by Franki of Canada, Limited, for graduate research in the field of soil mechanics at a Canadian university. The fellowship is

open to any graduate in civil engineering of a recognized university and preferably a Canadian citizen or a resident of Canada.

A statement that the proposed research project could be carried forward satisfactorily at the University of Alberta is required from the head of the university department within which it would be conducted.

A copy of the thesis is to be supplied to the donor.

Applications should reach the Administrator of Student Awards on or before April 1, in order that they may reach the company not later than April 15. The decision of the company will be known not later than June 1.

Imperial Oil Graduate Research Fellowships—The Imperial Oil Limited, in 1946, established for annual competition five research fellowships now having a potential value of \$4,800.00 each \$1,600.00 per year payable in Canadian funds for a maximum of three years), open to graduates of any approved university in Canada. In addition supplementary amounts of \$900.00 each may be given for up to three summer periods if the fellow continues his thesis work during such periods. These fellowships are offered for graduate study leading to a Doctor's degree in the fields of chemistry, physics or engineering (two fellowships), geology (one fellowship), economics, psychology, sociology or business administration (one fellowship), humanities such as English, ancient and modern languages, history, philosophy (one fellowship). Nomination of students for these fellowships is made by the University, such nominations being submitted to the Imperial Oil Scholarship Committee, Imperial Oil Limited, 111 St. Clair Ave. West, Toronto, not later than March 1, each year. Nomination forms and information as to the terms of the fellowships are available at the Student Awards office.

The International Nickel Graduate Research Fellowships have been established to promote and encourage academic research in the technical fields serving the Canadian metal industries and to further public interest in industrial science in Canada. A number of fellowships are available annually, having a possible tenure of three years each. The amount of each fellowship is \$2,500.00 per academic year, \$2,000.00 payable to the fellow through the university to which the fellowship has been awarded and \$500.00 to be at the disposal of the directing professor for necessary materials or equipment.

Applications on behalf of competent graduate students from any Canadian University qualified to confer the Master's or Doctor's Degree will be considered in the acceptable fields of research as follows: (a) Geology (including Geophysics); (b) Mining; (c) Ore Dressing; (d) Metallurgy (both process and physical); (e) Chemistry (pertaining to metals); (f) Physics (pertaining to metals); (g) Mathematics. Universities desirous of receiving one or more of these Fellowships should address their applications to The International Nickel Company of Canada, Ltd., 55 Yonge Street West, Toronto, Ontario, to reach it not later than February 14.

Any student who wishes to be considered for this award should apply by letter to the Administrator of Student Awards not later than January 15.

Steel Company of Canada Fellowships in Metallurgy. Four fellowships of \$2,000 each are offered annually to permanent residents of Canada who are graduates of a Canadian University, for research in Metallurgy. They are normally tenable for one year but in special circumstances may be renewed for a second year.

Further information may be obtained from the Administrator of Student Awards, University of Alberta. Completed applications must be sent to Canadian Universities Foundation, 77 Metcalfe St., Ottawa. For the year 1960 the last day for receipt is April 16.

Soroptimist Federation of the Americas Inc. The Western Canada Region of the Federation offers annually a fellowship to a woman student, either graduating or graduate, whose home is in Western Canada, and who is in need of financial assistance. The award is for postgraduate study at any university. The amount of this award is \$750 for the first year of study and the student may apply for a renewal for a second and a third year.

Application forms may be obtained from the Administrator of Student Awards. They must be forwarded to the Federation by March 1. A decision will be made by June 30.

The Woodrow Wilson National Fellowships, each providing a stipend of \$1,500 for one year, plus tuition costs and allowances for dependents, are available to outstanding students who are either undergraduates in their final year or graduates who have not yet entered a liberal arts graduate school. The intention of all applicants must be to prepare themselves by graduate study for a career in college teaching in the natural or the social sciences or the humanities. These are tenable in Canada or the United States.

In the first instance, candidates are nominated by faculty members. Since nominations must reach the officers of the Fellowship Foundation no later than October 31 for Fellowships tenable in the next academic year, intending candidates should get in touch with the head of the department concerned as early as possible in the first term.

PROVINCE OF ALBERTA ASSISTANCE

In addition to Province of Alberta Fellowships, Scholarships and Tuition Bursaries mentioned above, the Provincial Students Assistance Act also provides grants and loans in the Faculty of Graduate Studies at the University of Alberta.

Grants and Loans. Grants not exceeding \$450 depend on the previous year's academic standing. Loans not exceeding \$400 may be applied for either in conjunction with, or separately from, grants. Need must be established in all cases.

Application should be made early in the session or in January on the Provincial Government form.

Apply to Administrator of Student Awards.

UNIVERSITY LIBRARY

The Library of the University contains 206,000 accessioned volumes in Edmonton and 25,000 volumes in Calgary, a total of 231,000.

The University's main book collection is housed in the Rutherford Library. The Main Circulation Desk and Catalogue are in the Delivery Hall on the second floor, with the Periodical Room and the Main Reading Room opening from it. The Periodical Room contains about 1,000 current journals and newspapers of general interest. The Main Reading Room houses the General Reference collection, as well as an open-shelf collection of books of special interest to undergraduates.

Other special reading rooms in the building are: The Reserve Room, containing approximately 3,500 volumes of required reading for the Arts and Sciences courses; the Weir Memorial Law Library; the Medical Sciences Reading Room (for Medicine, Dentistry, Pharmacy, Nursing, and Physiotherapy); and the Applied Sciences Reading Room (for Agriculture, Engineering, and Chemistry).

The Stack Room, which houses the bulk of the book collection, occupies the entire south side of the building. Certain categories of senior students have access to it, but all students may borrow from it.

The building also contains seminar and conference rooms for small classes, an art gallery and museum, and a music listening room, where concerts of recordings are given during the noon hour.

The Education Library in Edmonton is housed in the Education Building. The University of Alberta at Calgary has its own library.

The Library subscribes to 2,000 of the more important general and technical journals, which are available for consultation.

UNIVERSITY BOOK STORE

For the convenience of students, the University maintains a book store where textbooks prescribed in the university calendar may be obtained. Stationery, drawing materials, university pennants and other accessories are also kept in stock. The book store is in the Administration Building.

EMPLOYMENT SERVICE

The National Employment Service maintains an office in the Administration Building. The University Committee on Student Employment cooperates with this service in securing employment for both undergraduates and graduates.

AFFILIATIONS

The University is a member of the Association of Universities of the British Commonwealth and of the National Conference of Canadian Universities and Colleges.

ACADEMIC COSTUME

Master's Degrees

Master's gowns are to be of Cambridge shape, i.e., black material falling below the knee, with black sleeves with semi-circular cut at bottom.

Hoods are to be of the Oxford pattern, of spruce green material with a full lining of the color distinctive of the faculty.

Doctor's Degrees

All doctor's gowns (Ph.D., Ed.D., D.Sc. and D.Litt.) are to conform to the Intercollegiate Code in design. They are to be of black material and the velvet trim is to be *Philosophy blue* for the Ph.D. gown and black for all others.

All doctor's hoods (Ph.D., Ed.D., D.Sc. and D.Litt.) are to conform to the Intercollegiate Code in shape, size and color. They are to be of black material to match the gown, and the full lining is to be of gold satin with a six-inch green satin chevron. The velvet trim distinguishes the four degrees and is to be: Ph.D.—Phil-

osophy blue; Ed.D.—Education light blue; D.Sc.—Science gold-yellow; D.Litt.—Letters white. There is to be a narrow green piping where the gold lining joins the black material.

PROGRAMS IN THE FACULTY OF GRADUATE STUDIES

The Faculty of Graduate Studies administers programs leading to the degrees of Master of Arts, Master of Education, Master of Science, Doctor of Education, and Doctor of Philosophy, and makes recommendations for granting the degrees of Doctor of Science and Doctor of Letters.

Graduate students are admitted to the Faculty in one of the following categories:

1. *Candidate for a master's degree.*
2. *Provisional candidate for a doctor's degree:*
All Ph.D. and Ed.D. students are admitted as provisional candidates for at least the first year of the program.
3. *Provisional graduate student* is one whose university record is either: (a) difficult to assess (e.g. some foreign students) or (b) below the standard normally required.
4. *Conditional graduate student* is one who is required to take undergraduate courses prerequisite to, and in addition to, the graduate program. Fees for such courses are not included in graduate program fees.
5. *Special graduate student* is one who wishes to take graduate courses for purposes other than degree credit at this university.

Graduates in Medicine who are proceeding with a program of clinical training, leading to the examination of the Royal College of Physicians and Surgeons of Canada, and who are registered in the Graduate Training Program of the Faculty of Medicine shall also be registered in the Faculty of Graduate Studies as special graduate students. Inquiries should be made to the office of the Dean of Medicine.

The Faculty of Graduate Studies is administered by a Dean and a Council representative of the departments offering graduate work. Inquiries should be addressed to the Dean, Faculty of Graduate Studies.

The general regulations apply to all graduate students. Additional requirements are outlined under the headings: "Master's Degree", "The Degree of Doctor of Philosophy", "The Degree of Doctor of Education", and "The Degrees of Doctor of Science and Doctor of Letters".

GENERAL REGULATIONS

Qualifications for Admission

The requirements for admission to candidacy for a degree are:

- (a) a baccalaureate degree or its equivalent with an average mark of at least 65% in the work of the last two undergraduate years, and
- (b) a statement from the head of the department concerned to the effect that the applicant is, in all respects, acceptable to the department.

Applicants should recognize that graduate work differs from undergraduate study in that it requires, in addition to formal course work, initiative and persistent industry directed toward a research project.

Should there be some question regarding academic competence or adequacy of preparation in the proposed field of study, an applicant may be accepted as a provisional graduate student. If, after the completion of one academic year, he has proven his competence or acquired basic training to the satisfaction of the department and the Faculty, he may be accepted as a candidate for a degree. If accepted, he may apply to the Faculty to have courses (other than required preparatory courses) completed during his status as provisional graduate student credited toward the requirement for a degree. Each such application will be considered on its individual merits. Special graduate students are not considered as candidates or potential candidates for a degree.

Application for Admission

Applications for admission to the Faculty must be submitted on forms supplied by the Dean. No assurance can be given that applications received after August 31 (for the winter session) April 1 (for the summer session) can be processed in time to permit registration. A graduate of another university must arrange with the Registrar of that institution to forward a transcript of his academic record to the Dean prior to September 1 or March 31. The Dean may require the applicant to furnish an official description of the content of the courses listed on the transcript.

Registration

An applicant accepted by the Faculty as a candidate for a Master's degree, as a provisional candidate for the Doctor of Philosophy degree, or the Doctor of Education degree, or as a "provisional graduate student", is required:

- (a) to register not later than October 1 if he proposes to work on his program during the winter session; or not later than April 29 if he proposes to work on his program in the summer session;
- (b) if he registers later, to pay a late registration fee for the winter session of \$3.00 and an additional \$1.00 per day for each day by which the registration is postponed beyond October 1.
- (c) to register for every session during which he plans to use University laboratory or library facilities;

(d) to register for the session in which he expects to complete his degree program; and

(e) to present with each registration a program of studies signed by the head of the department responsible for his graduate study program. A provisional graduate student will not be permitted to register in more than two courses in any department without approval of his program by the head of that department. Registration and program forms may be obtained from the office of the Dean.

(f) Provisional graduate students will not be accepted for extramural courses.

Academic Standards

In any course taken for credit toward an advanced degree the pass mark is 65%. No supplemental examinations are permitted. If, after consulting the department and any committee concerned, the Faculty decides that a candidate is not making satisfactory progress in either course work or research the candidate may be required to withdraw.

Thesis and Oral Examination

A candidate for a Master's or a Doctor's degree is required to submit a thesis and pass an oral examination. For purposes of spring graduation, a candidate is required to have the thesis approved and to pass the oral examination not later than April 14. The corresponding date for fall graduation is October 1. The thesis must be submitted to the department at least two weeks prior to the date of the oral examination. Failure to meet either of these deadlines will automatically delay the date of graduation unless special arrangements are made through the Dean.

Thesis Regulations

Number and Distribution of Copies

The student shall prepare five copies of his thesis, as follows:

1. The *original*, to be deposited in the office of the Faculty of Graduate Studies. This becomes the library copy after it has been examined by the Faculty.
- 2, 3. To be retained by the Department, or (if the Faculty has its own library) to become the library and the Department copy, respectively. One of these copies will be available for inter-library loan.
4. To be retained by the student.
5. To be retained by the supervisor. With the Department's permission this requirement may be waived.

Further copies may be required in special cases. For example, a student who holds a fellowship or financial assistance donated by a private individual or a company may be expected to provide a copy for the donor.

Binding

All copies should be bound in buckram (the color to be determined by the supervising Department or Division) with a short title and author's name printed in gold on the spine. Official copies (Nos. 1 - 3) *must* be so bound and lettered.

Paper

Regulation bond, 8½" x 11" (16 lb. weight for the initial copy). With special

permission and in special cases, 14" paper may be used. A photographic process is acceptable for charts and diagrams.

Margins

A minimum left margin of 1½ inches is required.

Order of Items

1. Title page.
2. Approval sheet (including, if desired, an indication of the weight of the thesis in the student's total program).
3. Abstract (not more than two pages).
4. Acknowledgments, if any.
5. Table of Contents (listing chapter heads and subheads, bibliography and appendix, if any).
6. List of Tables, if any.
7. List of Figures or Illustrations, if any.
8. Body of text.
9. Bibliography.
10. Appendix, if any.

General Form and Style

This may differ somewhat from Department to Department. The main point is consistency of form, tone, and level in a given thesis. It is recommended that students consult a manual on thesis writing that has been approved by their department.

Writers may use either footnotes or keyed bibliography, or both. Footnotes may be placed either at the foot of the page, or in a group at the end of the chapter or thesis — at the option of the supervising department.

General

Specimen copies may be examined in the Reference Room of the University Library. All students are requested to look at these, and to consult their supervisor or Department Head, before commencing to prepare their theses. Samples of the title page and of the approval sheet are available in the office of the Faculty of Graduate Studies.

Time Limit

To be recommended for a degree a candidate must complete all of the requirements within six years of the time he is first accepted for graduate study.

SPECIAL REGULATIONS

THE MASTER'S DEGREE

1. Full-time attendance for a minimum period of one academic year at the University is normally required of a candidate for a Master's degree. An alternative method of meeting the residence requirement may be considered on recommendation to the Faculty of Graduate Studies by the department or division concerned. Full-time attendance means attendance at classes or continuation of research or both at the University on a substantially full-time basis while registered as a graduate student.

2. The time necessary to complete the Master's degree depends on the candidate's preparation and progress. Normally at least two academic years are required, but exceptions may be made in the case of a graduate of a four-year specialized course. Further information is given under Programs of Study (starting p. 33).

3. A candidate entering the Faculty from a general undergraduate program is required to complete work equivalent to eight courses. The division of time between courses and research is to be determined by the department in which the candidate is studying. The research requirement may vary between one-quarter and one-half of the total program.

4. A candidate entering the Faculty from a four-year specialized undergraduate program, who is continuing work in the same field, is required to complete work equivalent to six courses. The division of time between courses and research is to be determined by the department in which the candidate is studying. The research requirements may vary between one-third and five-sixths of the total program.

5. The University offers courses in the summer session, extramurally, and in evening classes. Certain of these may be accepted in a Master's degree program, but no more than three may be taken in any twelve-month period without approval of the Dean. A maximum of two of the courses required in a Master's degree program may be taken extramurally, but only if the departments concerned approve.

6. The investigation must be conducted on a subject approved by the department and the Faculty, and for which library, laboratory and other facilities are available. The work is to be done under the supervision of a specified member of a department.

7. An examining committee for each candidate is approved by the Faculty. This committee consists of at least three faculty members, one of whom is from a department other than that sponsoring the investigation. The committee reviews the thesis for approval and conducts a public oral examination. The oral examination is designed to test the candidate's knowledge not only of the subject matter of the investigation, but in subjects relevant to his field of study.

THE DEGREE OF DOCTOR OF PHILOSOPHY

1. A student may be admitted as a provisional candidate for the degree of Doctor of Philosophy if he holds a bachelor's or a master's degree, or their equivalent, from an approved university other than the University of Alberta. Applications from University of Alberta graduates who have not obtained a degree from an

other university may be considered only on special recommendation to the Faculty of Graduate Studies by the department or division concerned. Admission is contingent upon recommendation by a department and upon the availability of suitable courses of study, library, laboratory and other facilities. Ph.D. applicants will be admitted as provisional candidates for at least one year and admission to candidacy will be approved only after the student has demonstrated competence.

2. The essential factor in the requirements for the doctorate is the demonstration on the part of the candidate of ability to carry out research of a high calibre leading to an advance in knowledge in the candidate's major field of study.
3. The time necessary to complete the requirements for the doctorate depends upon the progress of the candidate. For a candidate having a bachelor's degree a minimum of three academic years of study and research is required, of which two academic years must be in residence at the University of Alberta. For a candidate having a master's degree the normal requirement is two academic years of study and research in residence at the University of Alberta. An alternative method of meeting the residence requirement may be considered on recommendation to the Faculty of Graduate Studies by the department or division concerned.
4. The program of a candidate shall be under the direction of a committee of not fewer than three members appointed by the Faculty of Graduate Studies. The chairman of the committee shall be the faculty member under whose direction the candidate is carrying out his major research. At least one member of the committee shall be chosen from a department other than that in which the major research is being carried out. The committee shall recommend to the Faculty of Graduate Studies a program of course work and the detailed requirements of the program of research. The same committee shall arrange for the necessary examinations and for adjudication of the thesis.
5. At least one year before he presents himself for the degree, a candidate shall pass a preliminary oral examination in subjects relevant to the general field of his research. The examination shall be conducted by the supervising committee, with at least two other members of the teaching staff added to their number.
6. Before the candidate takes his preliminary examination he shall satisfy his committee that he possesses a knowledge of one of French, German and Russian sufficient for the reading of publications in this language. Departments may demand proficiency in such additional languages as are necessary. Students should check departmental requirements.
7. The results of the candidate's research shall be presented in a thesis satisfying the general requirements of the Faculty of Graduate Studies. The material must be of sufficient merit to be acceptable for publication in a reputable scientific or other scholarly journal. The thesis shall be approved by an examining committee, which shall consist of the supervisory committee and at least two other examiners, one of whom shall be an external examiner who is a recognized authority in the special field of research.
8. After the thesis has been approved, the examining committee shall conduct a public oral examination of the candidate, based largely upon the thesis.

THE DEGREE OF DOCTOR OF EDUCATION

The degree of Doctor of Education attests proficiency in a program of graduate study in which the emphasis is upon preparation for competent professional performance. The general regulations with respect to admission, residence requirements, preliminary examinations and final examinations for the Ed.D. degree are the same as those listed for the Ph.D. degree with the following exceptions:

- (1) Several years of successful teaching and an M.Ed. degree or its equivalent are prerequisites for admission.
- (2) A reading knowledge of French is required. Under special circumstances another language may be substituted.
- (3) The program emphasizes breadth in educational theory, practice and research rather than intensive specialization in a particular area.
- (4) The student's program may make provision for supervised field experiences.

THE DEGREES OF DOCTOR OF SCIENCE AND DOCTOR OF LETTERS

The degree of Doctor of Science (D.Sc.) or of Doctor of Letters (D.Litt.) may be conferred on persons considered by the General Faculty Council to have distinguished themselves by special research or learning in the respective domains of science and of the humanities or social sciences, subject to the following regulations:

1. The degrees of Doctor of Science and of Doctor of Letters are awarded exclusively on the basis of original work of merit carried out by the candidate, either individually or in cooperation with others. In the case of an application based upon cooperative work, the candidate shall submit a written statement indicating the share he personally has taken in the work. A reasonable proportion of the work must have been carried out at the University of Alberta.
2. Application must be made in writing to the Dean of the Faculty of Graduate Studies and should be accompanied by four reprints of all papers and by at least one copy of each book submitted by the candidate. The application, accompanied by the proper fee, must be submitted before the first day of November of the academic year in which it is proposed to take the degree.

PROGRAMS OF STUDY

This section contains alphabetically, according to departments, brief descriptive paragraphs which outline the departmental facilities, the fields of research and special interests, and special departmental regulations together with titles of graduate courses offered by the departments. Further information on courses, both graduate and undergraduate, will be found in the calendar of the appropriate Faculty or School.

NOTE: In the case of courses in which the weekly hours of instruction are fixed, these are set out for both terms of the winter session. The letter "s" attached to a figure signifies seminar-hours, the letter "a" hours allotted to assignments or discussion of assignments, and the letter "L" lecture-laboratory hours. Otherwise, the first figure in each term indicates lecture-hours and the second laboratory-hours. A new course numbering system was introduced last year. In some sections both the old and new numbers are included.

ANATOMY

Laboratory accommodation for a small number of graduate students is open to Arts and Science graduates and to medical students and graduates who wish to spend a year out of course doing advanced work in medical sciences. Application should be made as early as possible in the year preceding that in which the student plans to work.

ANIMAL SCIENCE

1. Graduate study may be undertaken in either the Animal Husbandry or Poultry Husbandry division of the Department of Animal Science. Excellent facilities are available for nutritional studies with livestock and poultry. A well-equipped chemical laboratory is maintained for research purposes.
2. The major part of the research effort of the department is in the field of nutrition and in this field a variety of programs of course work and research for advanced degrees may be arranged along fundamental or applied lines according to the qualifications and interests of individual students.
3. Opportunities are available for graduate study in animal or poultry breeding.
4. Information regarding assistantships and other forms of financial assistance currently available to students registered in programs for the M.Sc. or Ph.D. degree in the department will be supplied upon request. Students who wish to apply for assistance are advised to contact the head of the department by January 1 of the year in which they propose to register for graduate study.
5. The time required to complete a Master's program in the department varies according to the undergraduate training of the student and the nature of the research undertaken. Normally two academic years of course work and research and one summer of research or one academic year and two summers are needed to complete the requirements for the M.Sc. degree.
6. Normally students enrolled for the M.Sc. degree are required to complete two of the Animal Science graduate courses listed below plus at least two courses taken

in other departments. Courses in other departments commonly accepted in a Master's program are: Biochemistry 511, 531, 541; Biometrics 454; Chemistry 312, 370 or 372, 450; Genetics 462, 530, 612; Mathematics 304, 450; Pharmacy 501, 502; Zoology 410.

7. Courses for students enrolled for the Ph. D. degree may be arranged according to the background and interests of the candidate.

8. *Graduate Courses*

501. Research Projects in Animal Science	Max. of 6 hrs. credit
STAFF	
512. Advanced Nutrition	(3-3; 3-0)
STAFF	
600. Animal Science Seminar	(1s-0; 1s-0)
STAFF	

BACTERIOLOGY

1. Laboratory apparatus or bench space is available for two to three graduate students. Apparatus available is adequate for any investigational problem normally expected of Master's candidates. The facilities of the Provincial Public Health Laboratory, which carries out laboratory work for hospitals and practitioners within the northern half of the province, are also available.
2. The Department will consider investigational problems submitted by candidates in any field involving fundamental or applied bacteriology. Research grants, etc., may be available through the usual channels provided adequate time is allowed for application and approval.
3. Candidates for graduate work will be required to have a reasonable background in bacteriology or microbiology. In this University a reasonable background is indicated by a good standing in either the senior undergraduate course in Medical Bacteriology (i.e. Bacteriology 421(21)-361(61)) or the senior undergraduate course in Microbiology (Microbiology 360(60)). Students with an equivalent background from other universities will be considered by the Department for graduate work. Candidates will be expected to complete with good standing all senior undergraduate courses in medical bacteriology and microbiology which have not been completed during undergraduate years. In addition, much emphasis will be placed on the presentation of original material in seminars, on discussions concerning investigational work in progress in the Department, and on an adequate knowledge of research methods.
4. The following courses from other departments may be accepted in graduate programs: Agricultural Bacteriology, (Dairying 465(55)), Dairy Bacteriology (Dairying 466(56)), Soil Microbiology (Soil Science 430(54)), Genetics 451 (51), French 200(2), Mathematics 255(45), Biochemistry 511(101), German 200(2), and other courses as indicated in individual cases.

5. *Graduate Courses*

501. (101.) Microbiology

MEMBERS OF THE DEPARTMENT

BIOCHEMISTRY

1. The Department offers a program of course work and research leading to the degree of M.Sc or Ph.D. Prospective candidates should consult the head of the Department regarding research facilities and course requirements. Teaching assistantships and demonstratorships are often available, as well as financial assistance from research grants to faculty members. Application for financial assistance should be made, if possible, by December of the year previous to that in which the student wishes to begin graduate work. Availability of funds is usually made known by April.
2. The research work in the Department is at present in the following fields: chemistry of red blood cells; enzymes concerned with gasotrointestinal digestion and absorption; oxidative enzymes in tumor tissue; plant metabolism; chemistry and physical chemistry of proteins, lipid metabolism; clinical chemistry.
3. The following courses from other departments may be accepted on Master's programs: Bacteriology 360, Chemistry 450, 372, 312, Mathematics 304, Physiology 361.

4. *Graduate Courses*

501. **Advanced Laboratory** (0-3; 0-3)

STAFF

511. (101.) **Enzymology** (3-3; 0-0)

J. TUBA

531. (103.) **Chemistry of Proteins** (3-0; 0-0) or (0-0; 3-0)

L. B. SMILLIE AND C. M. KAY

541. **Biochemistry of Lipids** (3-0; 0-0) or (0-0; 3-0)

E. T. PRITCHARD

551. (105.) **Advanced Plant Biochemistry** (3-0; 0-0) or (0-0; 3-0)

MARY S. SPENCER

561. (106.) **Chemistry of the Erythrocyte** (3-0; 0-0) or (0-0; 3-0)

H. B. COLLIER

571. (104.) **Recent Advances** (3-0; 0-0) or (0-0; 3-0)

STAFF

N.B.—Not all graduate courses are offered every year. The head of the Department should be consulted regarding the availability of graduate courses in any academic session.

BOTANY

1. Laboratory accommodation for graduate students is available, with facilities for research in plant anatomy, cytology, morphology, ecology, taxonomy, physiology, and mycology.
Undergraduate students interested in graduate work in botany are invited to apply for assistantships tenable during the summer months to enable them to take part in research work.
2. A number of students are appointed as demonstrators in junior courses each year.
3. The following courses in other departments are commonly accepted as part of the M.Sc. program in Botany: Bacteriology 360 (60), Biochemistry 300 (50),

350(71), Chemistry 350(42), 372(54), 312(58), Entomology 301(41), Geology 353(53), Mathematics 255(45), Physics 341(41), Genetics 451(51), Plant Science 453(53), 481(81), 482(82), Soil Science 420(56).

4. *Graduate Courses*

(6L; 6L)

503. **Plant Geography and Ecology**

504. **Advanced Mycology**

505. **Advanced Plant Physiology**

506. **Advanced Taxonomy**

507. **Advanced Plant Anatomy and Histology**

CHEMICAL AND PETROLEUM ENGINEERING

1. The Department of Chemical and Petroleum Engineering offers facilities for advanced training and research leading to the Ph.D. degree in Chemical Engineering and to the Master of Science degrees in both Chemical and Petroleum Engineering.

For the Ph.D. program, all the requirements of the Faculty of Graduate Studies must be met. In addition, the Department requires that the candidate shall have satisfactorily completed approved courses in the major field and in at least one minor. Minimum requirements in the major field are courses equivalent to 24 term hours, 6 of which may be selected from the Department of Chemistry. Minimum requirements for the minor are 12 term hours in one field or 14 term hours in two fields. As part of the requirement for demonstrating competence for admission to candidacy for the Ph.D., a student must pass the comprehensive examinations set by the Department. These consist of three written examinations embracing the major fields of Chemical Engineering. A passing grade shall be 65% and not more than two may be repeated. The examinations are offered annually in September and may be written after the completion of one year of graduate studies by the candidate and after satisfying one of the foreign language requirements. Research may be started by the candidate at the discretion of the Department but normally would not be commenced until after he had passed the comprehensive examinations.

For the Master of Science degree, graduate work comprising both course and research work equivalent to a minimum of 12 months of full-time study is required. For the M.Sc. degree in Chemical Engineering, the minimum course requirements are Ch.E. 561, Ch.E. 567, Ch.E. 572, two other department graduate courses, and one further course, preferably outside the specialty. For the M.Sc. degree in Petroleum Engineering, the minimum course requirements are Pet.E. 582, Pet.E. 583, Pet.E. 592, either Pet.E. 585 or Pet.E. 584, either Ch.E. 577 or Pet.E. 580, and one other course, preferably outside the specialty.

The Master programs are designed so that about 50% weight is given to course work and 50% weight to research and thesis. Details of all programs must be worked out in consultation with the Department.

2. In chemical engineering, active research programs are being carried out in the following fields—flow of non-Newtonian fluids, two-phase vertical flow, hydrocarbon P-V-T and gas hydrate studies, pilot plant work in hydrocarbon pyrolysis processes, fluidization, reaction kinetics and catalysis, fluid dynamics of gas-solid systems.

In petroleum engineering, facilities are available for research in fluid flow through porous media, drilling fluids, electrical and physical characteristics of reservoir rocks, crude oil rheology and pipeline flow, miscible fluid displacement phenomena, flow phenomena in heterogeneous rock systems.

3. Up to the limit of its facilities, the Department is prepared to accept for graduate study in the appropriate field graduates from any university having a recognized curriculum in either Chemical or Petroleum Engineering. Graduates in other fields of engineering may be admitted under special arrangements involving the completion of undergraduate requirements.
4. Teaching assistantships are available for qualified students on a one-quarter, one-half or full time basis with remuneration according to the students' background and the hours of service. Scholarships and fellowships are available for research in both the fields of Chemical and Petroleum Engineering. Summer assistance can usually be arranged for students continuing their research through the summer months without scholarship support.

5. Graduate Courses

Chemical Engineering

- | | |
|---|------------|
| 561. Physical Rate Processes | (3-0; 0-0) |
| 552. Selected Topics in Unit Operations | (0-0; 3-0) |
| 565. High Pressure Technology | (3-0; 0-0) |
| 566. Process Control | (0-0; 1-3) |
| 567. Advanced Thermodynamics | (0-0; 3-0) |
| 572. Graduate Seminar | (1-0; 1-0) |
| 577. Advanced Mathematical Applications in Chemical and Petroleum Engineering | (3-0; 0-0) |

Petroleum Engineering

- | | |
|---|--------------|
| 580. Advanced Physical Properties and Behaviour of Petroleum Fluids | (3-1; 0-0) |
| 582. Advanced Reservoir Engineering | (3-0; 0-0) |
| 583. Advanced Topics in Petroleum Production Mechanisms | (0-0; 3-0) |
| 584. Secondary Recovery | (0-0; 2-3/2) |
| 585. Advanced Natural Gas Engineering | (0-0; 2-0) |
| 592. Graduate Seminar | (1-0; 1-0) |

CHEMISTRY

1. The Department of Chemistry has research laboratories and instructional facilities for at least one hundred and twenty graduate students proceeding to the M.Sc. and Ph.D. degrees in Chemistry.
2. The active research interests of the staff include:
Amperometric titrations and polarography. Mechanism of substitution reactions, optical activity, structure and thermodynamic stability of condensation compounds. Optical studies of solutions around working electrodes. Free radical reactions by mass spectrometry, deuterium exchange studies, isotope effects in acid-base catalysis and reactions of active nitrogen.

Mechanisms and stereochemistry of solvolytic reactions, mechanisms of homogeneous reductions and oxidations. Structures of monosaccharide derivatives and lycopodium alkaloids. Syntheses of carcinogens and anticarcinogens; condensation reactions of substituted toluenes, indoles, monosaccharide derivatives, sesqui- and diterpenes; reactivity of cellulose.

Photochemistry applied to boron hydrides, kinetics and free radical reactions, reactions at solid surfaces separation of isotopes. Physical chemistry of polymer and polyelectrolyte solutions (viscosity, light scattering, etc.). Radiation induced free radical chain reactions in the gas phase and in the liquid phase at low temperature, and the general radiation chemistry of organic compounds. Electron spin resonance studies of free radical reactions, active nitrogen flame reactions, relation of infrared band parameters to molecular structure. Molecular orbital methods.

3. Candidates for the M.Sc. and Ph.D. degrees in Chemistry should be graduates in Chemistry or Chemical Engineering from approved Universities, who meet the entrance requirements of the Faculty of Graduate Studies. All arrangements must be made through consultation with Professor H. E. Gunning, Head of the Department.

4. Graduate Courses

511. (105.) Instrumental Methods of Analysis	(0-0; 2-6)
W. E. HARRIS	
531. (106.) Advanced Inorganic Chemistry	(3-3; 0-0)
W. J. WALLACE	
550. (102.) Organic Chemistry	(3-6; 3-6)
R. B. SANDIN	
551. (109.) Qualitative Organic Analysis	(2-6; 0-0)
R. J. CRAWFORD	
553. (112.) Chemistry of Carbohydrates	(0-0; 3-3)
R. K. BROWN	
555. (114.) Theoretical Organic Chemistry	(0-0; 3-0)
R. J. CRAWFORD	
557. (119.) Physical Organic Chemistry	(0-0; 3-0)
D. DARWISH	
559. (120.) Natural Products	(3-0) (0-0)
W. A. AYER	
571. (107.) Colloid Chemistry and Surface Chemistry	(3-3; 0-0)
573. (108.) Electrochemistry	(0-0; 2-6)
575. (111.) Gas Kinetics	(3-3; 0-0)
G. R. FREEMAN	
577. (113.) The Phase Rule and Heterogeneous Equilibria	(3-0; 0-0) or (0-0; 3-0)
579. (115.) Chemical Thermodynamics	(3-0; 0-0)
H. B. DUNFORD	
581. (116.) High Vacuum Techniques	(3-3; 3-3)
P. KEBARLE	

583. (117.) Quantum and Statistical Mechanics	(0-0; 3-0)
R. N. O'Brien	
585. (118.) Solution Kinetics	(0-0; 3-0)
H. B. DUNFORD	
602. (151.) Departmental Research Seminar	(2S-0; 2S-0)
H. E. GUNNING	
587. Spectroscopy and Molecular Structure	(0-0; 3-0)
P. KRUEGER	
604. (152) Advanced Research Seminar	(2S-0; 2S-0)
CHEMISTRY STAFF	
611. Analytical Chemistry	(0-0; 3-0)
W. E. HARRIS	
631. Inorganic Chemistry	(3-0; 0-0)
W. J. WALLACE	
651. Organic Chemistry	(3-0; 0-0)
R. B. SANDIN	
653. Organic Chemistry	(0-0; 3-0)
R. B. SANDIN	
670. (104) Advanced Physical Chemistry	(3-0; 3-0)
H. E. GUNNING	
671. Physical Chemistry	(4-0; 0-0)
H. B. DUNFORD	
673. Physical Chemistry	(0-0; 0-4)
H. B. DUNFORD	

CIVIL ENGINEERING

1. Graduate work in the Department of Civil Engineering is carried out in the following fields:

(a) *Soil Mechanics*

Theoretical, experimental and problem courses related to the design of foundations, retaining walls, earth dams and slides.

(b) *Highway Engineering*

Theoretical, experimental and problem courses related to transportation engineering including planning, traffic and safety; the design and control of asphalt and concrete pavements and construction practice.

(c) *Structures and Strength of Materials*

Theoretical and experimental courses relating to the behavior of structures and structural elements, together with a thorough treatment of the analysis and design specifications of steel and reinforced concrete.

(d) *Concrete*

Experimental work related to durability, effects of admixtures, and properties of lightweight aggregate.

(e) *Hydraulics and irrigation*

Theoretical and experimental courses relating to the sedimentation and the design and control of river channels and canals.

The Department has well-equipped laboratories, particularly in the fields of soil mechanics, strength of materials, concrete, and hydraulics.

2. A student may be admitted as a candidate for the degree of Master of Science in Civil Engineering who holds a Bachelor's degree in Civil Engineering from the University of Alberta or from another recognized university and who has an average of at least 65% in his two senior years. Competent students from other departments will also be considered but may be required to take additional undergraduate courses as provisional graduate students before being admitted as candidates for a Master's degree in Civil Engineering. Normal requirements for a Master's degree are credit in four courses, two of which must be in the candidate's major field of interest, plus a thesis. In exceptional cases the course requirements may be reduced and additional work required on the thesis. A candidate may complete his Master's program in twelve months. However, students are advised if possible to spend two years, during which time they may be able to devote more time to their thesis topic and do guided reading in their special field. Financial assistance is available in the form of teaching assistantships or special research scholarships.
3. Any undergraduate course in the University that the Department deems necessary for acquiring a thorough background in the candidate's special field may be included in a graduate program.
4. A student may be admitted as a candidate for the degree of Doctor of Philosophy only in the fields of Soil Mechanics and Foundations, or Hydraulics and Hydrology.

5. *Graduate Courses*

C.E. 510. Pavement Design	(2-2; 2-2)
K. O. ANDERSON	
C.E. 512. Transportation Engineering and Geometric Highway Design	(3-0; 3-0)
J. J. BAKKER	
C.E. 530. Advanced Fluid Mechanics	(3-0; 3-0)
T. BLENCH	
C.E. 532. Advanced Hydrology	(3-0; 3-0)
T. BLENCH	
C.E. 533. River Engineering	(3-0; 3-0)
T. BLENCH	
C.E. 535. Open Channel Flow	(3-0; 3-0)
J. P. VERSCHUREN	
C.E. 540. Theoretical Soil Mechanics	(3-0; 3-0)
S. R. SINCLAIR	
C.E. 541. Advanced Soil Mechanics Laboratory	(0-6; 0-6)
S. R. SINCLAIR	
C.E. 542. Advanced Soil Mechanics Problems	(3-0; 3-0)
R. M. HARDY	

C.E. 560. Advanced Structural Analysis	(3-0; 3-0)
J. S. KENNEDY	
C.E. 561. Plastic Analysis and Design of Structures	(0-0; 3-0)
J. LONGWORTH	
C.E. 552. Advanced Design in Structural Steel	(3-0; 3-0)
J. LONGWORTH	
C.E. 563. Advanced Design in Reinforced Concrete	(3-0; 3-0)
R. N. McMANUS	

CLASSICS

1. Certain special facilities available in this Department include: Coins—fairly complete examples of Roman coins of Empire Period (100 in all), and electro-types of Greek and Roman coins; Glass—a collection of Roman glass (from Norton collections); Antiquities—on permanent loan from the Royal Ontario College of Archaeology, a number of objects useful for the study of Egyptian and Roman History; Vases—five original Greek vases; Slides—a fairly extensive collection of slides on subjects such as the Minoan-Mycenean civilization, Greek sculpture, Greek vase painting, etc.
2. In addition to the regular courses in Linguistics and History the Department can offer introductory courses in Numismatics (see above), Palaeography, Epigraphy, Sanskrit, and General Archaeology. There are *no* provisions for assistantships or fellowships.
3. Graduates from the general course may find it difficult to take an M.A. in Classics since the primary requisite is a knowledge of Greek and Latin. An M.A. in Latin or in Latin and French can be arranged in consultation with the Department.
4. French or German junior or senior courses and courses in the History of Philosophy may on occasion appear in M.A. programs.

5. *Graduate Courses* (3-0; 3-0)

Greek 501. (101.) Plato and Aristotle

To be selected

Greek 502. (102.) Homer, *Iliad*

W. G. HARDY

Greek 503. (103.) Pindar, *Odes*

W. G. HARDY

Greek 511. (111.) Advanced Greek Prose Composition

Greek 515. (115.) Greek and Latin Epigraphy and Palaeography

W. G. HARDY

Latin 501. (101.) Cicero, *Rhetorical Writings*

To be selected

Latin 502. (102.) Roman Comedy

W. G. HARDY

Latin 503. (103.) Lucretius, *De Rerum Natura*

A. D. WINSPEAR

- Latin 504. (104.) Greek and Italic Dialects**
To be selected
- Latin 505. (105.) Vergil, Complete Works**
W. G. HARDY
- Latin 506. (106.) Sanskrit**
W. G. HARDY
- Latin 507. (107.) Petronius, Apuleius**
W. G. HARDY
- Latin 508. (108.) Tacitus**
W. G. HARDY
- Latin 509. (109.) Tibullus, Propertius, Ovid, Amores**
- Latin 511. (111.) Advanced Latin Prose Composition**
- Latin 514. (114.) Comparative Philology and Comparative Syntax**
To be selected

DAIRY SCIENCE

1. The laboratories of the Department of Dairy Science are well equipped for research in dairy and food chemistry, dairy and food bacteriology, dairy and food technology and agricultural bacteriology. Research programs in these specialties are active in the Department.
2. The research of this Department receives financial support from such bodies as The Department of Agriculture, Ottawa; The National Research Council of Canada; and the National Defence Research Board. Such grants-in-aid provide for a limited number of assistantships. The assistants, if eligible, are permitted to register in the Faculty of Graduate Studies and their research findings may be presented to the University as M.Sc. or Ph.D. theses. Various Graduate Fellowships and Scholarships, such as those offered by the above-mentioned organizations are tenable in the Department.
3. Ordinarily Biochemistry 300 or 350, Chemistry 372, Mathematics 200 or 201, Dairy and Food Technology 350, Dairy and Food Bacteriology 466, Dairy and Food Chemistry 470 and Dairy Science 490 or their equivalents are admission requirements.

A reading knowledge of French or German within the field of interest is required for candidacy for the M.Sc. or Ph.D. degree, but a University course in either language is an acceptable substitute.

Graduates planning candidacy for a post graduate degree should consult with a member of the Department.

4. Extra-departmental undergraduate courses for which graduate credit may be given are: Animal Husbandry 468, 469; Microbiology 360, 361; Biochemistry 300 or 350; Botany 310, 320; Soil Science 430.

In special circumstances graduate credit may be given for Chemistry 372, Mathematics 200 or 201.

5. *Graduate Courses*

Dairy Science 500. Seminar (1-0; 1-0)

L. F. L. CLEGG, F. W. WOOD AND J. M. DE MAN

Advanced Dairy and Food Hygiene 471. Max. yearly credit one half course

L. F. L. CLEGG

Advanced Food Chemistry 571. Max. yearly credit one half course
J. M. DE MAN

Advanced Dairy and Food Technology 600. Max. yearly credit one full course
F. W. WOOD AND L. F. L. CLEGG

Advanced Applied Bacteriology 601. Max. yearly credit one full course
L. F. L. CLEGG

Advanced Dairy and Food Chemistry 602. Max. yearly credit one full course
J. M. DE MAN AND L. F. L. CLEGG

EDUCATIONAL ADMINISTRATION

1. Students who satisfy the admission requirements of the Faculty of Graduate Studies and who have the approval of the Division of Educational Administration may pursue programs of study and research leading to the degrees of M.Ed., Ed.D., and Ph.D. in Education.
2. Prospective students should first consult the Chairman of the Division for further information on programs of advanced study.
3. The work of this Division is closely co-ordinated with that of other divisions in the Faculty of Education. Furthermore, approved courses complementing or supplementing a candidate's program in education may be taken from departments in the university outside the Faculty of Education.
4. The Division makes special arrangements with public school systems and provincial departments of education so that facilities are available for student observation, research and participation in field projects.
5. A grant from the W. K. Kellogg Foundation of Battle Creek provides a number of fellowships for graduate students in educational administration. Several teaching fellowships in the Faculty of Education are also provided. The facilities of the Alberta Journal of Educational Research, published under the supervision of the Faculty and sponsored by the Alberta Advisory Committee on Educational Research, are available to graduate students in this Division.
6. *Graduate Courses*

Education

500. Education Seminar

STAFF

525. Education Supervision (0-0; 3-0)

J. H. M. ANDREWS

559. Administration of Public Education in Canada (3-0; 0-0)

H. T. SPARBY

561. Principles of Educational Administration (3-0; 0-0)

A. W. REEVES

563. Administrative Role of Principals and Superintendents (0-0; 3-0)

TO BE ANNOUNCED

NOTE: Full-year courses corresponding to the four half-year courses listed above are also available. They contain the topics covered in Education 525, 559, 561, and 563, plus additional related topics, and are designated Education 526, 560, 562, and 564 respectively.

566. Educational Finance (3-0; 3-0)
G. L. MOWAT

568. School Buildings and Pupil Transportation (3-0; 3-0)
G. L. MOWAT

NOTE: Courses numbered in the 600's are conference courses in which credit is given according to work done, to a maximum of six hours.

626. Educational Supervision
J. H. M. ANDREWS

660. Conference Course in Organization and Government of Public Education
H. T. SPARBY

662. Conference Course in Problems of Administration and Supervision
A. W. REEVES

654. Conference Course in Administrative Role of Principals and Superintendents
TO BE ANNOUNCED

666. Conference Course in Educational Finance
G. L. MOWAT

EDUCATIONAL PSYCHOLOGY

1. The Division of Educational Psychology has available for graduate students a psychometric laboratory, equipment for testing of vision and hearing, and special equipment for the diagnosis of reading difficulties. It operates an education clinic providing testing, diagnosis of special difficulties, and guidance for pupils referred to it from elementary and secondary schools. Staff members and graduate students have access to a modest IBM installation housed in the Education Building and used for the analysis of research data. Large sample research in intelligence, aptitude, interests, subject attainment and other areas of psychological importance may be arranged through the co-operation of the various school systems.
2. The Division provides graduate instruction in the areas of: (a) Educational Psychology; (b) Child Psychology; (c) Adolescent Psychology; (d) Mental Hygiene; (e) Guidance; (f) Clinical Psychology; (g) Testing and Measurement.
One assistantship is usually available in Clinical Psychology in winter sessions and in the summer session when the Education Clinic is in operation. One research assistantship is normally available during winter sessions.
3. Before a graduate student is admitted as a candidate for the M.Ed. degree his record must be acceptable to the Faculty of Graduate Studies and to the Division of Educational Psychology. The student will first consult with the Chairman of the Division, who, together with the members of the divisional staff, will plan an appropriate program. When the program has been recorded on the form provided by the Faculty of Graduate Studies and approved by the Chairman of the Division, it will be forwarded to the Dean of the Faculty of Graduate Studies for final ratification.

4. Approved senior courses in the Faculty of Arts and Science which strengthen or complement the candidate's graduate program in education are accepted on Master's programs.
5. The Division also provides instruction and guidance for suitable candidates entering upon the Ph.D. and Ed.D. programs.
6. The Alberta Advisory Committee on Educational Research, sponsored jointly by the Faculty of Education, the Department of Education, the Alberta School Trustees' Association, the Alberta Teachers' Association, and the Alberta Federation of Home and School Associations, maintains its headquarters in this Division. A grant from the Carnegie Corporation of New York provides a limited number of research fellowships for graduate students as well as funds for the extension of the research program. The *Alberta Journal of Educational Research* published under the supervision of the Faculty is the official outlet for reports of research sponsored by the Alberta Advisory Committee on Educational Research.
7. *Graduate Courses*

Education 500. Education Seminar

STAFF

502. Introduction to Educational Research

D. B. BLACK

508. Organization and Administration of the Guidance Program

(3-0; 3-0)

C. M. CHRISTENSEN

510. Counselling in Education

(3-3; 3-3)

C. M. CHRISTENSEN

570. Child Psychology

(3-0; 3-0)

C. C. ANDERSON

572. Psychology of Adolescence

(3-0; 3-0)

G. M. DUNLOP

574. Education Clinic

(3-0; 3-0)

W. B. DOCKRELL

576. Methods of Educational Research

(3-3; 3-3)

J. MACDONALD AND J. D. AYERS

578. Advanced Testing and Measurement

(3-0; 3-0)

R. S. MACARTHUR

670. Conference Course in Developmental Psychology

Max. of 6 hrs. credit

J. MACDONALD

674. Conference Course in Problems of Adjustment of School Children

Max. of 6 hrs. credit

C. C. ANDERSON

676. Conference Course in the Psychology of Learning

Max. of 6 hrs. credit

G. M. DUNLOP

**678. Conference Course in Education Measurement and
Experimental Research**

Max. of 6 hrs. credit

R. S. MACARTHUR

Other suitable graduate courses are listed under Secondary Education, Elementary Education, and Administration and Supervision.

ELECTRICAL ENGINEERING

1. Graduate work is offered by the Department of Electrical Engineering for electrical engineering graduates only, as our Mechanical Engineering Department is not equipped for advanced work of any kind.
2. The Department has facilities for research work in communication and UHF fields, and possesses modern research equipment including pulse type oscillograph. It also embodies a high voltage laboratory, equipped for investigation up to 100 kV 60 cycle and up to 400 kV impulse. Investigation can be undertaken in the field of insulation, power transmission, radio and telephone interference problems.
3. Part-time instructorships are available for graduate students who normally carry auxiliary courses in mathematics and physics. While these are usually in the graduate pattern, certain undergraduate courses are accepted if they are appropriate to the graduate program.
4. Graduate courses normally offered are:

521. (102.) Electric Circuits, Modern Power Transmission Problems

J. A. HARLE (2-6; 2-6)

561. (103.) Principles of Servomechanisms

J. W. PORTEOUS (2-6; 2-6)

571. (101.) Advanced Radio

J. W. PORTEOUS (2-6; 2-6)

ELEMENTARY EDUCATION

1. Associated with the Division of Elementary Education are demonstration schools—city, town and rural. To a limited degree the facilities of these schools may be made available as centres for special studies by graduate students. The facilities of the Department of Education may, by special arrangement, be made available to students doing graduate work.
2. The Division provides graduate instruction for three categories of students: (a) those interested in perfecting their instructional techniques for the primary and intermediate grades of the elementary school; (b) those interested in improving their qualifications to teach in a specialized subject matter area in the junior high school; (c) those interested in improving their instructional techniques in the elementary and junior high school subjects in order to become qualified for supervisory or administrative positions.

At present there is no provision for assistantships or fellowships in this Division.

3. Before a graduate student is admitted as a candidate for the M.Ed. degree his record must be acceptable to the Faculty of Graduate Studies and to the Division of Elementary Education. The student will first consult with the Chairman of

the Division, who, together with the student and members of the divisional staff will plan a master's program.

4. Approved senior courses in the Faculty of Arts and Science and in the Faculty of Education which strengthen or complement the candidate's program in Education may be assigned.
5. The research facilities provided through the Alberta Advisory Committee on Educational Research, sponsored jointly by the Faculty of Education, the Department of Education, the Alberta School Trustees' Association, the Alberta Teachers' Association, and the Alberta Federation of Home and School Associations, are available to graduate students in this Division. The *Alberta Journal of Educational Research* published under the supervision of the Faculty is the official outlet for reports of research sponsored by the Alberta Advisory Committee on Educational Research.
6. *Graduate Courses*

Education 500. Education Seminar

STAFF

518. Problems in Remedial Reading (3-0; 3-0)

MARION JENKINSON

520. Clinical Study of Remedial Reading (3-3; 3-3)

STAFF

522. Psychology and Supervision of Reading (3-0; 3-0)

STAFF

528. The Learning and Teaching of Mathematics in the Elementary and Junior High School (3-0; 3-0)

STAFF

682. Conference Course in Elementary Education Max. of 6 hrs. credit

Other suitable graduate courses are listed under Educational Psychology, Secondary Education, and Administration and Supervision.

ENGLISH

1. The English collection in the University Library permits work at the Master of Arts level in most fields of English Language and Literature. The Woods Collection on American-Canadian Relations makes possible advanced study of American Literature. An historical collection of children's books is also available.
2. The Department of English has regular provision for teaching assistantships. Application should be made, if possible, by April 30. Certain of the scholarships mentioned on pages 14-24 are also available for research in English.
3. Candidates for the Master's degree in English must satisfy the general regulations laid down above on pages 27-29. For candidates with an Honors B.A. in English, the standard prescription is four courses and a thesis. Candidates from the general undergraduate program are required to take six courses (plus the thesis). When the thesis undertaken is a major piece of work, the number of courses may be reduced.
4. Senior courses from other departments (such as History, Philosophy, Classics, Modern Languages, Fine Arts) may, with the approval of the Department, be chosen as minor subjects in English programs.

5. Courses of study will be prescribed from the published list of Senior Undergraduate courses, properly weighted for graduate work, and from the following graduate courses. Certain of these will be open to graduate students in other departments.

552. (140.)	Conference Course	(3-0; 3-0)
560. (141.)	Bibliography and Methods of Research	(1-0; 1-0)
568. (142.)	Literary Criticism (Principles and History)	(3-0; 3-0)
576. (143.)	Study of Language	(2-0; 2-0)
584. (144.)	Advanced Course in Writing	(3-0; 3-0)
588.	Studies in American Literature	(3-0; 3-0)
592. (150.)	Old Norse and Germanic Philology	(3-0; 3-0)
610. (151.)	Old English	(3-0; 3-0)
616. (152.)	Chaucer and his Contemporaries	(3-0; 3-0)
622. (153.)	The Scottish Chaucerians and English Literature of the Fifteenth Century	(3-0; 3-0)
628. (154.)	Mediaeval Drama	(3-0; 3-0)
634. (160.)	Spenser and Donne	(3-0; 3-0)
640. (161.)	Shakespeare and his Contemporaries	(3-0; 3-0)
646. (162.)	Early Seventeenth Century Poetry and Prose	(3-0; 3-0)
652. (163.)	Milton	(3-0; 3-0)
658. (171.)	Eighteenth Century Prose	(3-0; 3-0)
664. (180.)	Wordsworth and Coleridge	(3-0; 3-0)
670. (181.)	Nineteenth Century Thought	(3-0; 3-0)
676. (190.)	Studies in the Modern Novel	(3-0; 3-0)
682. (192.)	Poetry in English since 1939	(3-0; 3-0)

NOTE: The following courses will be offered in the 1960-61 session: English 560 (J. W. Bilsland), English 628 (F. M. Salter), and English 670 (E. W. Mandel and R. D. McMaster).

ENTOMOLOGY

1. Laboratory space is available for eight to ten graduate students. For research in taxonomy an extensive collection and reprint library exists. There is basic equipment for study and experiment in morphology, physiology, and applied entomology. Funds for special projects can usually be made available.
2. Candidates may register for the M.Sc. or Ph.D. degree.
3. Programs may include Entomology 301(41), 422(62), 523(63), 414(64), 475(65), 456(66), and courses from other departments appropriate to the student's needs and interests, such as the following: Bacteriology 400(60); Biochemistry 350(71), Botany 310(51), 320(52), 504(104), 505(105), Chemistry 372(54), 312(58) Geology 353(53), German 310(40b), Genetics 462(62), Philosophy 360(61), Physics 341(41), Physiology 361(61), 462(62), 505(105), 506(106), Plant Pathology 481(81), 482(82), Biometrics 454(53), 603(103), Mathematics 255(45), 450(62), Soil Science 430(54), Zoology 300(51), 350(52), 460(54), 580(105), 521(110).

4. *Graduate Courses*

Entomology 512. (102.) Advanced Morphology, Physiology, and Histology (0-6; 0-6)

B. HOCKING

Entomology 521. (101.) Taxonomy for Graduate Students (0-6; 0-6)

G. E. BALL

GEOGRAPHY

1. The Department of Geography offers the M.A. and the M.Sc. in Geography.
2. Candidates' programs will be prepared under the regulations for "The Master's Degree" (see p 30), with the further requirement of a reading knowledge of a modern foreign language other than English (ordinarily French or German).
3. A number of teaching assistantships are available for qualified students.
4. Courses in other departments may be chosen as subjects of minor interest with the approval of the Department.
5. Courses of study will be prescribed from the published list of senior undergraduate courses and from the following graduate courses:

Geography 501. Air Photo Interpretation (6L; 6L)

A. H. LAYCOCK

Geography 502. Reading and Seminar Course

STAFF

Geography 504. Mediterranean Lands (3L-1s; 3L-1s)

R. COMMON

Geography 506. Scandinavia (3-1s; 3-1s)

W. C. WONDERS

Geography 550. Research in Regional Geography

STAFF

Geography 551. Research in Physical Geography

STAFF

GEOLOGY

1. The Department of Geology offers graduate work to the level of the Doctor's degree. The M.Sc. or Ph.D. degree may be obtained by passing satisfactorily a suitable course of studies in addition to the presentation of a thesis.
2. The fields of study open for research in the Department are: mineralogy, petrology, geochemistry, paleontology, stratigraphy, sedimentation, economic geology, geomorphology, glacial geology and structural geology. Teaching assistantships are available for qualified students.

3. *Graduate Courses*

Geology 501. (101.) Advanced Structural Geology (0-0; 3-0)

H. A. K. CHARLESWORTH

Geology 502. (102.) Sedimentary Petrology and Sedimentation (2-0; 0-4)

J. LERBEKMO

Geology 503. (103.) Advanced Stratigraphy (3-3; 3-3)

P. S. WARREN

Geology 505. (105.) Micropaleontology (2-4; 2-4)

C. R. STELCK

Geology 506. (106.) Geochemistry	(3-3; 3-3)
H. BAADSGAARD	
Geology 507. (107.) Igneous and Metamorphic Petrology	(0-0; 3-3)
R. A. BURWASH	
Geology 508. Precambrian Geology	(3-3; 0-0)
R. A. BURWASH	
Geology 510. Advanced Mineralogy	(6L; 6L)
F. A. CAMPBELL	
Geology 511. (111.) Regional Structural Geology	(3-0; 0-0)
Geology 512. (112.) Pleistocene Geology	(0-0; 3-0)
Geology 513. (113.) Field Work in Geomorphology and Glacial Geology	
One day of field work each week (½-year course)	
Geology 514. (114.) Rock Analysis	
Geology 609. (109.) Geological Research	
MEMBERS OF THE DEPARTMENT	

HISTORY

1. Students contemplating graduate work in History should direct their enquiries to the Head of the Department.
2. The Department offers instruction leading to the Ph.D. in the following fields: Canada in the 17th and 18th centuries; the Canadian West; the American West. The attention of prospective candidates is directed to the general regulations for the degree on page 30 of the calendar. Individual programs will be arranged in consultation with the Department.
3. Instruction leading to the degree of Master of Arts is offered in the standard fields of British, European, Canadian and American history. The Department especially invites inquiry from qualified students who wish to do research in the following fields:
 - (1) Medieval Europe
 - (2) France
 - (3) Russia
 - (4) Reformation Europe
 - (5) Canada under the French Régime
 - (6) The Canadian West
 - (7) The American West

The Rutherford Library affords facilities for some advanced work in these fields. Its resources include the Woods Collection of *Americana* and the Rutherford Collection of *Canadiana*.

Students who wish to do advanced work in other fields should consult the Head of the Department.

4. For the Master of Arts degree, an honors graduate in History will ordinarily be required to complete two courses, History 600 and History 602, in addition to his thesis. Additional courses may however be required. A student with a pass degree, provided he has had at least four senior History courses, will be required

to take at least four Graduate courses in History in addition to History 600 and History 602. All candidates for the Master's degree must in addition carry out research in a chosen field of investigation under the direction of one or more members of the Department, and embody the results in a thesis. A reading knowledge of a modern language other than English, ordinarily French or German, will be required of all candidates. For specialization in some fields a working knowledge of other languages will be necessary.

5. A number of graduate scholarships are available. For terms of award, see pages 14-24. Smaller sums are available within the Department for readers.
6. Courses in other Departments may, with the approval of the Department, be taken in graduate programs in History. Courses not at the Honors and Graduate level may in some circumstances be taken by graduate student, but not normally for credit.
7. The Honors graduate may expect to complete the requirements for the Master of Arts degree in one year; the graduate with a pass degree will require at least two years. Full-time attendance for at least one academic year is required. No extramural courses are offered and no Graduate courses are offered in the Summer Session or the Evening Division.

8. A limited number of the graduate courses listed below are available each year.

History 502. (108.) Medieval Europe	(3-0; 3-0)
History 504. (110.) The Age of Louis XIV	(3-0; 3-0)
History 506. (111.) The Age of the Enlightenment	(3-0; 3-0)
History 508. (112.) The French Revolution	(3-0; 3-0)
History 510. (113.) Europe 1815 - 1870	(3-0; 3-0)
History 512. (114.) Europe since 1870	(3-0; 3-0)
History 514. (109.) The West Slavic Peoples since 1800	(3-0; 3-0)
History 516. (115.) Russia since 1861	(3-0; 3-0)
History 518. (125.) Slavonic and Soviet Studies: an interdepartmental seminar.	
History 520. (116.) Medieval Britain	(3-0; 3-0)
History 522. (117.) England under the Tudors and Stuarts	(3-0; 3-0)
History 524. (118.) Britain in the 19th century	(3-0; 3-0)
History 526. The British Empire and Commonwealth since 1815	(3-0; 3-0)
History 530. (119.) Canada during the French Régime	
History 532. (120.) Canada 1763-1867	(3-0; 3-0)
History 534. (121.) The Canadian West	(3-0; 3-0)
History 540. (122.) The Westward Expansion of the United States	(3-0; 3-0)
History 550. (124.) Latin America	
History 560. (123.) The Far East	(3-0; 3-0)
History 600. (200.) Conference course: open to Graduate students only.	

Directed study in special subjects to meet individual requirements.

History 602. (107.) Philosophy of History and Historiography (3-0; 3-0)

Open to graduate students only. Required of all graduate students in History.

MATHEMATICS

1. The Mathematics Department can offer postgraduate courses in a number of fields, including number theory, real variable theory, differential equations, tensor analysis, theoretical physics, differential geometry, modern algebra, and mathematical statistics.
2. Several teaching assistantships, involving up to six hours a week of elementary teaching, are available for candidates working towards a higher degree.
3. Courses taken in other departments will depend upon the field of interest of the candidates. Courses in physics may include 480(53), 470(54), 520(60), 510(101), 550(102), or 570(104), or Astronomy 410.
4. Candidates for the M.Sc. degree are normally expected to submit a thesis in one of the fields mentioned above, with at least two graduate courses, one or both of which must be in the Department of Mathematics.
5. The M.Sc. degree may be taken in a minimum of one year after the Honors degree. Candidates for the two-year program (from a pass degree in the Mathematics pattern) will be required to take at last six courses, with a research project in the second year. They may also be required to write a comprehensive examination at the end of the first year of the program.
6. Candidates for the Ph.D. degree will spend at least two years from the completion of the M.Sc. degree in advanced study and research. The major requirement is a substantial contribution to knowledge, embodied in a thesis.

The work will be under the general direction of an *ad hoc* committee. A preliminary oral examination will be given at least one year before completion of the thesis.

7. Prospective students should consult both the head of the department and the staff member in charge of the field in which they are particularly interested.

Mathematical Physics

The Master of Science and Doctor of Philosophy degrees in Mathematical Physics may be taken in the Mathematics department by a student with a good background in both Mathematics and Physics. Candidates with an Honors degree in Mathematics will be required to write a thesis on some topic in the field of theoretical, rather than experimental Physics, or in Applied Mathematics.

The program of graduate courses will be selected in consultation with the heads of the departments of Mathematics and Physics.

Candidates who have a B.Sc in the Mathematics pattern of the general course, with three or more courses in Physics, may be accepted for a two-year M.Sc. program in Mathematical Physics. The general conditions of paragraph five above will apply.

Statistics

The Master of Science and Doctor of Philosophy degrees in Mathematical Statistics may be taken in the Mathematics department.

Candidates for the M.Sc. degree with an Honors degree in Mathematics will be required to take at least two graduate courses in theoretical statistics and to write a thesis on some topic in this field.

Candidates with a B.Sc. in the Mathematics pattern of the general course may be accepted for a two-year M.Sc. program if their pattern has included Mathematics 255(45), and Mathematics 450(62) or their equivalent. The general conditions of paragraph five above will apply.

Honor and Graduate Courses

A selection of courses, depending on demand, will be made from the following list:

500. (102.) Theory of Functions of a Complex Variable	(3-0; 3-0)
510. (107.) Modern Algebra	(3-0; 3-0)
515. (110.) Number Theory	(3-0; 3-0)
520. (103.) Differential Geometry	(3-0; 3-0)
540. (101.) Theory of Functions of Real Variables	(3-0; 3-0)
550. (104.) Elementary Quantum Mechanics and Special Relativity Theory	(3-0; 3-0)
522. Quantum Mechanics	(2-0; 2-0)
555. (109.) Hydro- and Aero-dynamics	(3-0; 3-0)
560. (106.) Estimation and Statistical Hypotheses	(3-0; 3-0)
562. (111.) Theory of Games	(2-0; 2-0)
564. (114.) Analysis of Variance	(3-0; 3-0)
570. (121.) Probability Theory and Applications	(2-0; 2-0)
580. (105.) Tensor Analysis	(3-0; 3-0)
600. (112.) Analysis. Special Functions	(3-0; 3-0)
605. (113.) Mathematical Logic	(2-0; 2-0)
610. (115.) Calculus of Finite Differences	(3-0; 3-0)
615. (116.) Integral Equations	(3-0; 3-0)
620. (117.) Conformal Mapping	(3-0; 3-0)
625. (118.) Analytic Number Theory	(3-0; 3-0)
630. (119.) Topology	(3-0; 3-0)
635. (108.) Statistical Mechanics	(3-0; 3-0)
640. Advanced Numerical Analysis	(3-5; 3-5)
650. (120.) Selected Topics in Theoretical Physics	(3-0; 3-0)
651. Advanced Relativity Theory	(2-0; 2-0)
660. Stochastic Processes	(2-0; 2-0)

MEDICINE AND CLINICAL MEDICINE

There are facilities in the Department of Medicine to permit graduate students to proceed to Master of Science degrees. Fellowships are available on an annual basis for suitable candidates. Information on this subject can be obtained by applying to the Head of the Department.

MECHANICAL ENGINEERING

1. The Department of Mechanical Engineering offers graduate work in the field of Applied Mechanics.
2. The normal requirements for a Master's Degree are credit in four full year courses or heir equivalent, two of which must be in the candidate's major field of interest, plus a thesis.
3. Financial assistance is available in the form of part time teaching assistantships. The student should also note the availability of various scholarships listed under Awards and Financial Assistance.

4. *Graduate courses*

E.M. 551. Theory of Elasticity (3-0; 3-0)

G. FORD

E.M. 552.* Dynamics of Structures (0-0; 3-0)

J. S. KENNEDY

E.M. 553. Theory of Plates and Shells (0-0; 3-0)

J. S. KENNEDY

E.M. 554. Theory of Elastic Stability (0-0; 3-0)

G. FORD

E.M. 555.* Theory of Plasticity (3-0; 0-0)

Mech.E. 520.* Advanced Combustion Engineering (2-3/2; 2-3/2)

D. PANAR

Mech.E. 525. Gas Dynamics (3-0; 3-0)

C. M. RODKIEWICZ

5. Some senior courses in Mathematics, Physics and Civil Engineering will be accepted as part of the M.Sc. program.

*To be offered starting 1961-62.

MINING AND METALLURGY

The Department of Mining and Metallurgy is prepared to offer graduate work in the fields of Mineral Dressing, Hydrometallurgy, Pyrometallurgy and Physical Metallurgy. Graduate programs in each of these fields, leading to the degrees of M.Sc. and Ph.D. in Metallurgy, M.Sc. and Ph.D. in Metallurgical Engineering, may be arranged.

Graduates in the basic Sciences or Engineering are eligible to apply.

The Department in recent years has acquired new and enlarged space facilities and much new and specialized equipment has been added.

Fields of interest include a variety of projects in both Physical and Extractive Metallurgy.

Graduate courses offered in the Department are as follows:

Mct.E. 500. Metallurgical Thermodynamics

Met.E. 501. Kinetics of Metallurgical Processes

Met.E. 502. Advanced Crystallography

Met.E. 503. Corrosion

Met.E. 504. Flotation

Met.E. 505. Hydrometallurgy

Met.E. 506. Research Techniques in Metallurgy

NOTE: The Department reserves the right to offer only those graduate courses for which a sufficient number of students register.

MODERN LANGUAGES

1. Special fields of interest: French, Spanish, German or Russian *literature* or *linguistics*. Assistantships are available in French, German and Russian. The collections in these fields in the library do not permit work beyond the Master of Arts level in this University.
2. Candidates for the degree of Master of Arts will consult the head of the Department before registering for graduate work. The latter, in consultation with other members of the Department, will plan a special course of study to meet each candidate's needs.
3. Any relevant senior course offered in the University may be taken by a candidate for the Master of Arts degree.
4. *Graduate courses*

French

510. (103.) Seminar in French Composition	(3-0; 3-0)
M. FAUCHER	
550. Semantics, Lexicography and Linguistic Geography	(3-0; 3-0)
E. VON RICHTHOFEN	
580. Stylistics as Applied to French Literature	(3-0; 3-0)
E. VON RICHTHOFEN	
600. (101.) French Medieval Literature	(3-0; 3-0)
E. VON RICHTHOFEN	
605. Chansons de geste and Romans courtois	(3-0; 3-0)
E. VON RICHTHOFEN	
610. (107.) The Renaissance	(3-0; 3-0)
C. H. MOORE AND M. FAUCHER	
612. The Spirit of Humanism in France and England at the Beginning of the Renaissance	(3-0; 3-0)
I. SOWTON AND C. H. MOORE	
614. Rabelais	(3-0; 3-0)
C. H. MOORE	
616. Ronsard	(3-0; 3-0)
C. H. MOORE	
618. Montaigne	(3-0; 3-0)
M. FAUCHER	
620. The French Moralists	(3-0; 3-0)
M. FAUCHER	
625. Molière	(3-0; 3-0)
M. FAUCHER	
630. The Eighteenth Century Novel	(3-0; 3-0)
E. J. H. GREENE	

634. **Marivaux** (3-0; 3-0)
E. J. H. GREENE
636. **Voltaire** (3-0; 3-0)
E. J. H. GREENE AND C. H. MOORE
638. **Rousseau** (3-0; 3-0)
E. J. H. GREENE
645. **Stendhal** (3-0; 3-0)
M. FAUCHER
648. **Literature and the Plastic Arts from the Time of
Delacroix and Baudelaire** (3-0; 3-0)
M. FAUCHER
649. **Franco-German Literary Relations during the
Nineteenth Century** (3-0; 3-0)
C. H. MOORE
650. **Maupassant** (3-0; 3-0)
C. H. MOORE
651. **The Naturalistic Novel** (3-0; 3-0)
C. H. MOORE
655. **The Late Nineteenth Century Theatre**
C. H. MOORE
665. **Valéry** (3-0; 3-0)
E. VON RICHTHOFEN
670. **Proust** (3-0; 3-0)
M. FAUCHER
699. (111.) **Conference Course**
E. J. H. GREENE, M. FAUCHER, C. H. MOORE AND E. VON RICHTHOFEN

Spanish

540. **History of the Spanish Language** (3-0; 3-0)
B. PLASKACZ
602. **The Poem of the Cid** (3-0; 3-0)
E. VON RICHTHOFEN
605. **Early Spanish Prose** (3-0; 3-0)
E. VON RICHTHOFEN
665. **Contemporary Spanish Poetry** (3-0; 3-0)
E. VON RICHTHOFEN
670. **Modern Spanish and Latin American Novelists** (3-0; 3-0)
E. VON RICHTHOFEN

German

500. **Special Reading Course** (3-0; 3-0)
J. SZÖVERFFY
510. (107.) **Advanced German Composition and Conversation** (3-0; 3-0)
A. ARNOLD

530. (101.) German Medieval Literature and Philology	(3-0; 3-0)
J. SZÖVERFFY	
540. (103.) Old High German Philology and Literature	(3-0; 3-0)
J. SZÖVERFFY	
*550. Gothic	(3-0; 3-0)
J. SZÖVERFFY	
*560. History of the German Language	(3-0; 3-0)
J. SZÖVERFFY	
*570. Survey of Germanic Philology	(3-0; 3-0)
J. SZÖVERFFY	
*600. An Introduction to the Study of Lyric Poetry: Goethe's Poems	(3-0; 3-0)
E. REINHOLD	
*603. German Poetry from the Twelfth to the Nineteenth Century	(3-0; 3-0)
ALISON P. SCOTT	
*606. The Development of the German Drama	(3-0; 3-0)
E. REINHOLD	
*609. Development of the German Novelle, with Emphasis on the Nineteenth Century	(3-0; 3-0)
E. REINHOLD	
*612. The German Roman from Johann Fischart to Jakob Wassermann	(3-0; 3-0)
A. ARNOLD	
*615. History of German Literature to the Age of Goethe	(3-0; 3-0)
ALISON P. SCOTT	
*630. Lessing and the Period of Enlightenment	(3-0; 3-0)
ALISON P. SCOTT	
*640. Goethe's Faust and the Faust Legend	(3-0; 3-0)
E. REINHOLD	
*650. Schiller's Historical Dramas	(3-0; 3-0)
ALISON P. SCOTT	
*660. Heinrich Heine and the Young Germany Movement	(3-0; 3-0)
A. ARNOLD	
*670. The German Drama of the Nineteenth Century	(3-0; 3-0)
E. REINHOLD	
*680. The Life and Works of Gerhart Hauptmann	(3-0; 3-0)
E. REINHOLD	
*690. Contemporary German Poetry	(3-0; 3-0)
A. ARNOLD	
695. Anglo-German Literary Relations from the Sixteenth to the Nineteenth Century	(3-0; 3-0)
E. REINHOLD	

*These courses were formerly given as German 115, Seminar Courses (Literature and Philology).

699. Conference Course

MEMBERS OF THE DEPARTMENT

An honors or graduate course designed to meet the needs of individual students. It may include the detailed study of an author, period, genre, or any literary problem not dealt with in the honors or graduate courses listed above.

Russian**540. (115a.) Introduction to Comparative Slavonic Philology (3-0; 3-0)**

TO BE ANNOUNCED

600. Early Eastern Slavonic Literature (3-0; 3-0)

O. STARCHUK

640. (115c.) Russian Poetry of the Eighteenth and Nineteenth Centuries (3-0; 3-0)

O. STARCHUK

660. (115i.) The Russian Psychological Novel (3-0; 3-0)

O. STARCHUK

670. Soviet Russian Literature (3-0; 3-0)

O. STARCHUK

699. Conference Course

MEMBERS OF THE DEPARTMENT

PAEDIATRICS

Facilities exist within the Department of Paediatrics for students who wish to proceed to the M.Sc. Degree.

Inquiries should be directed to the Head of the Department of Paediatrics, University Hospital.

PHARMACY

1. The Faculty of Pharmacy offers programs leading to the M.Sc. and Ph.D. degrees and can accommodate a limited number of graduate students in modern well-equipped laboratories. Facilities include an animal room for experimental animals.
2. Research may be undertaken in fields such as: pharmaceutical chemistry, pharmacology, pharmacognosy, and radioactive tracer work. Financial assistance is available from the Canadian Foundation for the Advancement of Pharmacy, and from other sources.
3. Candidates should consult with the Dean regarding the requirements.
4. Undergraduate courses commonly accepted: Biochemistry 400(60), Botany 310(51), Chemistry 450(52), 372(54), 312(58).
5. *Graduate Courses*

501. (101.) Isotope Tracer Methodology (3-3; 0-0)

B. E. RIEDEL

502. (102.) Radioisotopes (0-0; 3-3)

B. E. RIEDEL

PHILOSOPHY AND SOCIOLOGY**Philosophy**

1. Good library facilities are available for the fields shown below.
2. Advanced work may be pursued in any of the following: Ethics, Aesthetics, Social Philosophy, History of Philosophy, Logic and Scientific Method. Graduate students in these fields may compete for the general graduate scholarships listed elsewhere; small sums are also available within the Department for readers.
3. Applicants for the one-year M.A. program in Philosophy must have completed training equivalent to that of graduates with honors in Philosophy from this Department. Applicants for the two-year M.A. program should consult the Department for assessment of the quantity and quality of their undergraduate training in philosophy.
4. The following courses in other departments are commonly accepted as part of the M.A. program in philosophy: Classics 359(50), 355(55), 356(56), and 357(57); English 372(59); Political Science 310(63); Psychology 382(61); 488(62) or 502(105); Sociology 302(40). Other senior and graduate courses which can be integrated with the specific programs of individuals will also be approved.

Courses in this Department which may be included within M.A. programs in philosophy are: Philosophy 340(52), 342(53), 344(54), 350(55), 352(58), 354(59), 358(60), 360(61), 462(62).

5. Graduate Courses

- 540. (110.) **Ancient Philosophy (Advanced Course)**
- 542. (102.) **Modern Philosophy** (3-0; 3-0)
- 544. (108.) **History of Philosophical and Scientific Thought**
- 545. (111.) **Mediaeval Philosophy**
- 548. (109.) **Conference Course in Philosophy**
- 550. (105.) **Aesthetics (Advanced Course)**
- 554. (104.) **Theory of Value**
- 558. (107.) **Philosophy of Religion**
- 560. (103) **Logic (Advanced Course)**
- 564. **Metaphysics**
- 566. (112.) **Theory of Knowledge** (3-0; 3-0)
- 568. (113.) **Philosophy of Mind**

Sociology

1. Fields of specialization presently available for M.A. work in Sociology are: social theory, social psychology, social research, family, and social problems.
2. An adequate library is under development. Opportunities for research in connection with the thesis, as well as research in relation to classwork, are available in the community. Graduate students in the Division of Sociology may compete for the general graduate scholarships listed elsewhere. Small sums are also available within the Division for various kinds of research and reading assistance.

3. In addition to the general requirements for the M.A. degree set forth by the Faculty of Graduate Studies, all applicants for the M.A. in Sociology must:
 - (a) Present a good reading knowledge of a language other than English (either French, German, Russian or Spanish) and/or a course in statistics, and
 - (b) Pass a comprehensive examination on the general field of Sociology towards the end of their graduate work.
4. Senior courses in Sociology may be included in the graduate program upon recommendation of the Division of Sociology.
5. Senior courses from related fields may also be included in the graduate program upon recommendation of the Division of Sociology.

PHYSICS

1. Programs leading to the M.Sc. and Ph.D. degrees in Physics are open to suitable graduates in Honors Physics, Engineering Physics, or equivalent courses. Individual programs will be arranged in consultation with the Head of the Department of Physics and members of the department. M.Sc. programs can be arranged both in Edmonton and in Calgary.
2. The minimum requirements for the M.Sc. degree are one full year of study and research beyond the level of the Honors B.Sc. degree in Physics. Candidates with deficiencies in this respect will be required to remedy these and to write a comprehensive examination during their first year. The program in the final year will include a minimum of two courses and a research project of sufficient merit to form the basis of a thesis.
3. The minimum requirements for the Ph.D. degree are two full years of study and research beyond the level of the M.Sc. degree in Physics or in Mathematical Physics. The program will include a minimum of two courses and a thesis based on original research. A reading knowledge of two of French, German, Russian, will normally be required.
4. *Theoretical Physics.* The major fields of theoretical research are: Solid state physics, physical acoustics, theoretical nuclear physics, elementary particles, field theory. A digital computer is available for complex numerical calculations.
5. *Experimental Physics in Edmonton.* Research projects are available in the following fields: nuclear physics (with a 2 Mev Van de Graaff generator), low temperature and solid state physics, geophysics, mass spectroscopy, precision optical spectroscopy, microtopography, radiation and medical physics.
6. *Experimental Physics in Calgary.* Research in the following fields is carried on in Calgary: cosmic rays (in association with the Sulphur Mountain Observatory near Banff), biophysics (using electron microscope), magnetic resonance.
7. A number of half-time teaching fellowships are available for graduate students who have no other financial assistance. The stipends vary from \$2,100 to \$2,400. Inquiries concerning these fellowships should be addressed to the Head of the Department.

In addition to the above, summer student assistantships to the value of \$800 are expected to be available in most research projects. The attention of students is directed to the availability of the various graduate awards listed under "Graduate Awards".

8. The following undergraduate courses are offered regularly, and are available to graduate students in other departments and to students in the two-year M.Sc. program: Physics 440(56), 470(54), 480(53), 510(101), 520(60), 550(102).

9. *Graduate Courses*

- | | |
|---|--------------|
| 516. (105.) Solid State Physics | (2-0; 2-0) |
| S. B. WOODS | |
| 540. (99.) Advanced Electronics | (2-1S; 2-1S) |
| H. A. BUCKMASTER | |
| 560. (100.) Physical Optics | (3-0; 3-0) |
| K. B. NEWBOUND | |
| 570. (104.) Quantum Mechanics | (2-0; 2-0) |
| L. E. H. TRAINOR | |
| 572. Nuclear Physics | (2-0; 2-0) |
| W. K. DAWSON | |
| 610. (106.) Advanced Course in Theories of the Solid State | (2-0; 2-0) |
| A. B. BHATIA AND D. D. BETTS | |
| 614. (107.) Advanced Thermodynamics and Statistical Mechanics | (2-0; 2-0) |
| H. GRAYSON-SMITH AND L. E. H. TRAINOR | |
| 620. (108.) Advanced Problems in Geophysical Exploration | (2-0; 2-0) |
| G. D. GARLAND AND K. VOZOFF | |
| 622. (115.) Advanced Earth Physics | (2-0; 2-0) |
| G. D. GARLAND AND K. VOZOFF | |
| 640. Advanced Electromagnetic Theory | (2-0; 2-0) |
| H. SCHIFF | |
| 650. (110.) Special Topics in Theoretical Physics | (2-0; 2-0) |
| 658. Applications of Group Theory to Quantum Mechanics | (2-0; 2-0) |
| L. E. H. TRAINOR | |
| 660. (103.) Atomic Theory and Spectroscopy | (2-0; 2-0) |
| K. B. NEWBOUND AND J. H. HARROLO | |
| 664. (113.) The Production and Optics of Free Elementary Particles and Ions | (2-0; 2-0) |
| C. E. CHALLICE | |
| (Given in Calgary) | |
| 670. (109.) Advanced Quantum Mechanics | (3-0; 3-0) |
| H. SCHIFF | |
| 672. (111.) Theoretical Nuclear Physics | (3-0; 3-0) |
| J. T. SAMPLE | |
| 674. (112.) Radiation Physics | (2-0; 2-0) |
| D. B. SCOTT | |
| 678. (114.) Cosmic Radiation | (2-0; 2-0) |
| B. G. WILSON | |
| (Given in Calgary) | |

PHYSIOLOGY AND PHARMACOLOGY

1. Facilities are available for graduate training and research leading to the M.Sc. degree in either discipline. The laboratory is adequately equipped for work in the fields of cardiovascular physiology and pharmacology, neurophysiology, temperature regulation, haematology and certain aspects of biophysics, endocrine, respiratory and general physiology. A research program leading to the Ph.D. degree can be provided in certain of these fields.
2. A program has been arranged for graduates in Medicine wishing to spend a year in a basic science department. The program includes graduate courses, a weekly seminar, duties as class laboratory demonstrator, participation in a research project and optional attendance at undergraduate lectures; either physiology or pharmacology may be stressed, as the candidate chooses. This training does not lead to a degree, but may satisfy some of the course requirements for an M.Sc. should the candidate later decide to undertake a research project leading to a thesis.
3. The M.Sc. program can be entered by graduates in Arts and Science, in which case the period before submission of the thesis will normally be two years, and by graduates in Medicine or Dentistry, in which case the period will normally be twelve months. In either case a comprehensive knowledge of the elements of physiology and pharmacology (with emphasis on one or the other) must be demonstrated before submission of the thesis. A program in either case will include graduate courses, participation in a weekly seminar, a limited amount of teaching experience, optional attendance at undergraduate lectures and pursuit of an approved research problem.
4. Prerequisite courses can be specified only at the time of arrangement of the candidate's program, although some biological sciences should have been studied. The requisites of prime importance are a good academic standing and a desire to study biological function.
5. A modest financial support of a candidate can usually be arranged, and this is aided by early application by the student.
6. Graduate and undergraduate courses offered by the Departments of Anatomy, Biochemistry, Chemistry and Physics may be included in the candidate's program.
7. Two Teaching Fellowships are available to graduate students; applications for these should be received before March 15 of each year.
8. *Graduate Courses*

Physiology

- | | |
|---|------------|
| 501. (101.) Reflex activity of the cardiovascular system* | (3-0; 0-0) |
| J. W. PEARCE AND STAFF | |
| 502. (102.) Methodology in physiology | (0-3; 0-3) |
| STAFF | |
| 503. (103.) The nerve impulse and synaptic transmission* | (3-0; 0-0) |
| J. W. PEARCE AND STAFF | |
| 504. (104.) Physiology of the adrenal and thyroid glands* | (0-0; 3-0) |
| E. O. HOHN AND STAFF | |
| 505. (105.) Advanced physiological techniques** | (1-6; 0-0) |
| C. HEATH AND STAFF | |

506. (106.) Tutorial and reading course (1-3; 0-0)
STAFF

600. (200.) Seminar (0-0; 1s-0)
STAFF

Pharmacology

501. Tutorial and reading course (Credit 4 hrs.)
STAFF

502. Methodology in Pharmacology (0-3; 0-3)
STAFF

503. Bioassays* (0-0; 1-6)
C. W. NASH, C. N. GILLIS AND J. D. TAYLOR

504. Pharmacological aspects of autonomic transmitted substances*
C. W. NASH, C. N. GILLIS AND J. D. TAYLOR

*Offered every second year.

**Offered if registration sufficient.

PLANT SCIENCE

1. Facilities. The Department has excellent facilities for research in the various fields. These include greenhouse, growth chamber and field accommodation for growing, handling and storage of plant material. Laboratories have modern equipment and instruments for specialized studies in biochemical, cytological, ecological, genetical, pathological and physiological investigations.

2. Cytogenetical and genetical studies are under way with a number of crop plants. Considerable work is under way with antibiotics and certain agricultural chemicals as they affect host-pathogen relationships in the field of plant pathology. Plant growth regulators and other compounds are studied under field and laboratory conditions especially as they affect weed control and crop production. Investigations are continuing on various fundamental aspects of quality in crops and on biochemical materials and physiological processes. Basic studies are under way in various phases of production of forage crops and horticultural crops.

Assistantships are available in a number of projects from money provided by various grants or from the University.

3. Applicants who are considered satisfactory on the basis of general admission regulations, may be admitted for graduate work in Plant Science provided adequate facilities and space are available for the project they propose to undertake. Graduate students are not required to take a foreign language for the Master's degree, but they are advised to do so if they contemplate going on to the doctorate.

4. *Undergraduate courses commonly accepted.* Normally all courses listed as senior are acceptable on the graduate program. It should be emphasized that course outlines are normally based on the student's previous training and anticipated needs in the field he has chosen.

5. Graduate Courses

Plant Science

500. (200.) Seminar in Plant Science (1s-0; 1s-0)

Biometrics

603. (103.) Experimental Design (2-2; 2-2)
L. P. V. JOHNSON AND W. E. SMITH

Field Crops

503. (101.) Reading Projects in Field Crops Max. of 6 hrs. credit
W. E. SMITH
504. (102.) Research Projects in Field Crops Max. of 6 hrs. credit
W. E. SMITH

Genetics

505. (101.) Reading Projects in Genetics and Plant Breeding
Max. of 6 hrs. credit
GENETICS STAFF
506. (102.) Research Projects in Genetics and Plant Breeding
Max. of 6 hrs. credit
GENETICS STAFF

Genetics

530. Microbial Genetics (0-4; 0-4)
J. WEIJER
611. (111.) Cytology and Cytogenetics (2-3; 2-3)
J. UNRAU, G. W. R. WALKER AND J. KUSPIRA
612. (112.) Advanced Genetics (2-1a; 2-1a)
L. P. V. JOHNSON AND W. E. SMITH
(Not offered in 1960-61).

Horticulture

507. (101.) Reading Projects in Horticulture Max. of 6 hrs. credit
STAFF
508. (102.) Research Projects in Horticulture Max. of 6 hrs. credit
STAFF
509. (103.) Selected Topics in Horticulture Max. of 6 hrs. credit
STAFF

Plant Ecology

501. (101.) Reading Projects in Plant Ecology Max. of 6 hrs. credit
WM. G. CORNS
502. (102.) Research Projects in Plant Ecology Max. of 6 hrs. credit
WM. G. CORNS

Plant Pathology

511. (101.) Reading Projects in Plant Pathology Max. of 6 hrs. credit
A. W. HENRY
512. (102.) Research Projects in Plant Pathology Max. of 6 hrs. credit
W. P. SKOROPAD
631. (131.) Advanced Plant Pathology (0-3; 0-3)
A. W. HENRY AND W. P. SKOROPAD

Plant Physiology and Biochemistry

513. (101.) Reading Projects in Plant Physiology and Biochemistry
Max. of 6 hrs. credit

A. G. McCalla AND SAUL ZALIK

514. (102.) Research Projects in Plant Physiology and Biochemistry
Max. of 6 hrs. credit

A. G. McCalla AND SAUL ZALIK

520. (120.) Plant Morphogenesis (2-2; 2-2)
SAUL ZALIK

POLITICAL ECONOMY

1. Graduate work in the department may be undertaken in either Economics or Political Science. Economics embraces the various branches of economics, including agricultural economics. Political Science embraces the various branches of the study of the theory and organization of governments.

2. *Economics*

A candidate for the two-year M.A. degree must fulfil the following requirements before being admitted to the M.A. program:

Obtain standing in at least *four* Economics courses at this University or their equivalent at another university. Three of these must be senior courses.

Political Science

As above, except that the phrase Political Science should be substituted for the phrase Economics.

3. *Graduate Courses*

- | | |
|--|------------|
| 500. (102.) Modern Economic Theories | (3-0; 3-0) |
| 501. (101.) History of Economic Theory | (3-0; 3-0) |
| 502. (105.) A General Reading and Seminar Course | (3-0; 3-0) |
| 601. (120.) Advanced Economic Theory | (3-0; 3-0) |
| 611. (121.) Economic Development | (3-0; 3-0) |
| 613. (131.) Economic Geography | (3-0; 3-0) |
| 621. (124.) International Economics | (3-0; 3-0) |
| 631. (125.) Labor Problems | (3-0; 3-0) |
| 641. (126.) Monetary Theory and Policy | (3-0; 3-0) |
| 651. (127.) Public Finance and Fiscal Policy | (3-0; 3-0) |
| 653. (130.) Transportation and Public Utilities | (3-0; 3-0) |
| 661. (128.) Agricultural Economics | (3-0; 3-0) |
| 663. (132.) Agricultural Marketing | (3-0; 3-0) |
| 671. (129.) Business and Government | (3-0; 3-0) |
| 681. (122.) Business Cycle Analysis | (3-0; 3-0) |
| 691. (123.) Comparative Economic Systems | (3-0; 3-0) |

Political Science

- | | |
|------------------------------------|------------|
| 600. (120.) Political Institutions | (3-0; 3-0) |
| 610. (121.) Political Theory | (3-0; 3-0) |

621. Government of Canada	(3-0; 3-0)
651. (123.) Public Administration	(3-0; 3-0)
661. (122.) International Politics	(3-0; 3-0)

PSYCHOLOGY

1. Local hospitals are available for observation and testing; industrial and military contacts have also been established. An extensive library of group, performance and projective testing materials is maintained. There is a small laboratory with animal room attached, limited equipment on hand, and facilities for local construction of apparatus for research.
2. Fields of specialization are: Clinical Psychology, General and Experimental Psychology, Industrial Psychology, Military Psychology, Social Psychology. Students in these fields may compete for the general graduate scholarships listed elsewhere; National Research Council scholarships are open to students of psychology; the Henry Marshall Tory Memorial Scholarship is open to students in this Department. Research assistantships are occasionally available under grants for specific research projects; small sums are always available within the Department for readers.
3. Applicants for the one-year M.A. program in psychology must have completed eight courses in psychology. Applicants for the two-year M.A. program must have completed four courses in psychology and one in philosophy or sociology. Applicants for the M.Sc. programs in psychology must have a B.Sc. with comparable training in psychology and must be specializing in general and experimental psychology.
4. The following courses in other departments are commonly accepted as part of the M.A. program in psychology: Education 570, 572; Mathematics 255(45); Philosophy 240(40), 352(52), 354(54), 360(61), 462(62), 568(113); Physiology 462(62); Political Economy 330(65); Sociology 510(54), 326(55), 380(60), 510(101), 542(103). Other senior and graduate courses which can be integrated with the specific programs of individual students will also be approved.
5. Courses in this Department which may be included within M.A. programs in psychology are: Psychology 340(52), 382(62), 430(63), 460(59), 488(61).
6. *Graduate Courses*

502. (105.) History of Psychology	(3-0; 3-0)
D. E. SMITH	
504. (106.) Conference Course in Psychology	
520. (113.) Seminar in Industrial Psychology	(3-0; 3-0)
530. (109.) Research in Psychometrics	(3-3; 3-3)
534. Experimental Design	(3-3; 3-3)
536. (107.) Clinical Psychometrics	(3-3; 3-3)
D. SPEARMAN	
538. (116.) Advanced Clinical Psychometrics	(3-3; 3-3)
540. (115.) Seminar in Social Psychology	(3-0; 3-0)
542. (117.) Research in Personality and Social Psychology	(3-3; 3-3)
560. (104.) General Experimental Psychology (Advanced)	(3-3; 3-3)

562. (110.) Research in Learning and Memory	(3-3; 3-3)
566. (111.) Research in Sensory Processes	(3-3; 3-3)
568. (112.) Research in Emotions and Motivation	(3-3; 3-3)
572. (101.) Physiological and Comparative Psychology	(3-3; 3-3)
580. The Study of the Individual	(3-0; 3-0)
584. (114.) Seminar in Personality Theory	(3-0; 3-0)
588. (102.) Abnormal Psychology	(3-0; 3-0)
D. SPEARMAN	
590. (108.) Clinical Psychology and Therapy	(3-3; 3-3)
D. SPEARMAN	

SECONDARY EDUCATION

1. The work of this Division is closely co-ordinated with that of other Divisions in the Faculty of Education and with the Departments of the Faculty of Arts and Science. The Division is associated also with demonstration and practice schools of the City of Edmonton, and with the Alberta Department of Education. The facilities of all these bodies are, in varying degrees, available to graduate students.
2. The Division provides graduate instruction in history of education, philosophy of education, curriculum and teaching. Graduate programs normally include both professional courses and courses in the liberal arts and sciences.
3. Before a student can be admitted as a candidate for the M.Ed. or higher degree his record must be acceptable to the Faculty of Graduate Studies and to the Division. He should first consult the chairman of the Division who, together with the members of his staff, will plan an appropriate program.
4. The research facilities provided through the Alberta Advisory Committee on Educational Research, sponsored jointly by the Faculty of Education, the Department of Education, the Alberta School Trustees' Association, the Alberta Teachers' Association, and the Alberta Federation of Home and School Associations, are available to graduate students in this Division. The *Alberta Journal of Educational Research* published under supervision of the Faculty is the official outlet for reports of research sponsored by the Alberta Advisory Committee on Educational Research.
5. *Graduate Courses*

Education 500. Education Seminar

STAFF

580. Curriculum Development	(3-0; 3-0)
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W. WORTH

594. History of Education	(3-0; 3-0)
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B. E. WALKER

680. Teaching in the Secondary School	Max. of 6 hrs. credit
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E. W. BUXTON AND STAFF

692. Conference Course in Philosophy of Education	Max. of 6 hrs. credit
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H. S. BAKER AND STAFF

696. Comparative Education

Max. of 6 hrs. credit

H. S. BAKER AND B. E. WALKER

Other suitable graduate courses are listed under Educational Psychology, Educational Administration, and Elementary Education.

SOIL SCIENCE

1. The Department of Soil Science has special research laboratories and facilities in the Agriculture Building and adjacent greenhouses for each of the fields of interest listed below.

The Alberta Soil Survey occupies quarters in the same building and graduate students have an opportunity to broaden their knowledge by association with the Soil Survey staff.

Some special apparatus for research is available as follows: spectrophotometer; fraction collector; Van Slyke apparatus; flame photometer; Geiger counter apparatus—for determining radioactive sulphur, phosphorus, etc.; animal rooms for feeding tests with rats, rabbits, etc.; incubation and inoculation chambers; autoclaves; Sharples centrifuge; International subsoil centrifuge; tension and pressure plates for soil moisture studies; Uhland soil core sampler; aggregate analysis equipment; chromatography column.

The Department has plots on black soil at Edmonton and on grey soil at Breton for field tests, and carries on co-operative fertilizer experiments with farmers over a wide area. A complete line of field equipment is available for plot work with cereal and forage crops.

2. Special fields of interest: soil genesis and classification; soil physics; soil chemistry; soil organic matter; soil microbiology; soil fertility; soil testing. Receiving special attention at present are the following:
 - (a) Soil survey problems: mineral and organic composition, weathering, leaching, clay characteristics, cation exchange, etc.
 - (b) Soil erosion problems: especially water erosion.
 - (c) Soil irrigation problems: especially infiltration studies on solonchic (hardpan) soils.
 - (d) Soil fertility and plant nutrition problems: fertilizer and rotation studies, soil deterioration under cultivation, straw utilization, nitrification, nitrogen fixation, and phosphorus availability.
 - (e) Soil organic matter: its chemistry and biochemistry.
 - (f) Soil structure problems: especially the value of gypsum as an amendment for solonchic soils.

Grants, bursaries and students are available for soil research from the National Research Council, the Province of Alberta, and several large industries interested in crop production and the use of fertilizers. Prospective graduate students are invited to apply for one of these forms of financial assistance. Applications should be directed to the head of the Department of Soil Science.

3. Graduate students who have the necessary training may take work leading to the degree of M.Sc. in Soil Science. Exceptionally well qualified graduates of other universities may be considered as candidates for the Ph.D. degree. Graduate

work in Soil Science, related courses in other departments, and a research project in a field of work covered by the list of Soil Science courses may be selected in consultation with the student's adviser. Students interested in post-graduate work should consult with or write to the head of the Department of Soil Science.

4. Some of the courses in other departments that are commonly accepted for graduate credit include: Bacteriology 400(60), Biochemistry 350(71), 511(101), (102), Botany 320(52), Chemistry 372(54), 312(58), Dairying 465(55), 466(56), Geology 351(51), 454(54), 459(59), Mathematics 304(40), Biometrics 603(103) Physics 341(41), 380(46).
5. Courses in Soil Science which may be accepted for graduate credit: Soil Science 453(53), 454(54), 455(55), 456(56).
6. *Graduate Courses*

Soil Science

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|-------------|---|-----------------------|
| 501. (101.) | Special Topics and Problems | Max. of 6 hrs. credit |
| 520. (102.) | Chemical Methods as Applied to Research | (1-3; 0-0) |
| | D. L. LYNCH | |
| 530. (103.) | Physical Methods as Applied to Research | (0-0; 1-3) |
| | J. A. TOOGOOD | |
| 531. (131.) | Seminar | |
| | J. D. NEWTON | |

SURGERY AND CLINICAL SURGERY

Research facilities are available in the McEachern Laboratory for graduate students who wish to register for the degree of M.Sc. This laboratory is well equipped for all types of experimental work on animals of all sizes. Special facilities are available for projects in the fields of experimental cardiovascular, gastrointestinal, renal and endocrine physiopathology. An adequately equipped isotope laboratory and a biochemical laboratory with technical staff are available in any of the clinical fields to assist the graduate students who wish to carry out a research project in this laboratory.

Inquiries should be directed to the Head of the Department of Surgery, University Hospital.

ZOOLOGY

1. Normal laboratory facilities are available for students proceeding to the M.Sc. degree. The Departmental and Main University Libraries contain adequate source material for graduate students. A reference collection of the invertebrate and vertebrate fauna of Alberta is housed in the Department. The University of Alberta and the Alberta Department of Lands and Forests operate the Alberta Biological Station which serves as a headquarters for summer field work.
2. All phases of wildlife are of interest to this Department and particular emphasis is placed on the study of fish, bird and mammal populations. An annual grant to the Alberta Biological Station is available for the payment of salaries to summer workers at the Station.
3. Students who contemplate proceeding to postgraduate work should consult the Department prior to seeking admission to the Faculty of Graduate Studies.

4. Courses from other departments frequently taken: Bacteriology 360(60), Biochemistry 300(50), Genetics 451(51), Physiology 361(61), Senior Botany and Entomology courses.

5. *Graduate Courses*

Zoology

520. **Seminar in Zoology** (1-0; 1-0)

STAFF

521. **Mechanisms of Evolution** (0-0; 3-0)

J. R. NURSALL

(Not offered in 1960-61).

525. **Field Course in Zoology**

STAFF

529. **Special Problems in Zoology** (3 hrs. either or both terms)

STAFF

540. **Environmental Physiology** (1-5; 1-5)

C. P. HICKMAN

555. **Wildlife Parasitology** (0-0; 3-3)

J. C. HOLMES

562. **Conservation Topics** (1-0; 1-0)

565. **Principles of Conservation and Wildlife Management** (3-3; 3-3)

W. A. FULLER AND V. LEWIN

566. **Animal Behavior**

(Not offered in 1960-61).

580. **Histology and Microtechnique** (3-3; 3-3)

G. O. MACKIE

(Not offered in 1960-61).

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